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SUPERVISOR: PROF. DR. JOHAN CHRISTIAENS | CO-SUPERVISOR: PROF. DR. BRICE DE RUYVER

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PROF. DR. MARC DE CLERCQ

(GHENT UNIVERSITY, DEAN)

PROF. DR. PATRICK VAN KENHOVE

(GHENT UNIVERSITY, ACADEMIC SECRETARY)

PROF. DR. JOHAN CHRISTIAENS

(GHENT UNIVERSITY, SUPERVISOR)

PROF. DR. BRICE DE RUYVER

(GHENT UNIVERSITY, CO-SUPERVISOR)

PROF. DR. FREYA VANDER LAENEN

(GHENT UNIVERSITY)

PROF. DR. PAUL GEMMEL

(GHENT UNIVERSITY)

PROF. DR. JONATHAN CAULKINS

(CARNEGIE MELLON UNIVERSITY)

PROF. DR. KOEN PUTMAN

(VRIJE UNIVERSITEIT BRUSSEL)

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EXECUTIVE SUMMARY

In Europe, one widely accepted standard is that public resources should be used in the most efficient and effective way, therefore governments need to supervise the expenditures and evaluate the policy at the same time. This dissertation tries to guide the policy makers with an economic evaluation of the drug policy. It presents an economic evaluation of the Belgian drug policy with a public expenditure study on legal and illegal drugs, and a generalised cost-effectiveness analysis on alcohol. In addition, this dissertation contributes to European policy research with cross-country comparisons on public expenditures (on drug policy and substance abuse treatment in hospitals) and on cost-effectiveness.

The first study “Drugs in Figures III” measures the public expenditures (anno 2008) on illegal and legal drugs (tobacco, alcohol and psychoactive medication). The financial data are collected by the top-down and bottom-up approach, followed by the procedure of data processing (drug specific data, a proration technique and unit expenditure). The study presents the percentage of government money for drugs (illegal drugs, alcohol and psychoactive medication) that is spent on the traditional four pillars of drug control: prevention (1.24%), treatment (76.5%), harm reduction (0.24%) and law enforcement (21.67%). Furthermore, the public expenditures on illegal drugs are examined over time and across countries, in order to provide insight into the dynamics of drug policy. However, this cross-country comparison is encountered with difficulties because of conceptual and methodological.

The second study concentrates on the public spending for illegal drug and alcohol treatment in hospitals for 21 EU member states. A uniform methodology is used with data drawn from the Eurostat database (anno 2010 data) to enable a valid cross-national comparison. The total public spending for hospital-based treatment of illegal drug and alcohol abuse in the 21 EU member states is presented. The results confirm that public expenditures for alcohol treatment exceed those for illegal drug treatment. Furthermore, this study also shows a large variation in public spending on substance abuse treatment in hospitals across the EU member states. The variation between countries is explained by factors such as the hospital cost per day, the organization of substance abuse treatment, cultural and social norms regarding substance use, etc.

The third study focuses on the generalised cost-effectiveness of alcohol interventions. Firstly, this study evaluates the cost-effectiveness of the Belgian alcohol policy (anno 2008). The WHO cost-effectiveness modelling framework is used to measure the effect of alcohol interventions on the health of the Belgian population (expressed in disability adjusted life years, DALYs). The combination

of six alcohol interventions is investigated: random breath testing, mass media “drink driving” campaign, increased taxation, advertising ban, reduced hours of sale and brief intervention in primary care. Advertising ban appear to be the most cost-effective intervention to reduce alcohol burden in Belgium, a volumetric taxation and a reduction of opening hours complete the top three. Secondly, the cross-country comparison suggests that these legislative interventions are the most cost-effective strategies in multiple countries.

In conclusion, the public expenditure study and the generalised cost-effectiveness analysis (GCEA) are important tools for the economic evaluation of a national drug policy. These economic evaluations aid policy makers with the reallocation of drug budgets, and they contribute to a more evidence-based drug policy. Moreover, the cross-country comparisons (on public expenditures and on cost-effectiveness) should enable us to compare the drug policies of different countries. Hence, the challenge continues to find a way to overcome the methodological and conceptual problems in a cross-country comparison.

NEDERLANDSTALIGE SAMENVATTING

In Europa, geldt het algemeen principe dat publieke uitgaven op de meest efficiënte en effectieve manier dienen te worden besteed, bijgevolg dienen deze uitgaven te worden gecontroleerd en geëvalueerd door overheden. Dit proefschrift tracht beleidsmakers hierbij te ondersteunen met een economische evaluatie van het drugsbeleid. Er wordt een economische evaluatie van het Belgische drugsbeleid gepresenteerd met een studie naar de overheidsuitgaven voor legale en illegale drugs, en een “generalised” kosteneffectiviteit analyse (GCEA) van alcoholinterventies. Daarenboven, draagt dit proefschrift bij tot het Europees beleidsonderzoek met een cross-country studie van de overheidsuitgaven (enerzijds van het drugsbeleid, anderzijds van illegale drug en alcohol behandeling in ziekenhuizen) en de kosteneffectiviteit.

De eerste studie “Drugs in Cijfers III” meet de overheidsuitgaven (anno 2008) voor het beleid inzake illegale en legale drugs (tabak, alcohol en psychoactieve medicatie). De financiële data werden verzameld aan de hand van de top-down en bottom-up aanpak, vervolgens werd de data verwerkt (drugspecifiek, verdeelsleutel of eenheidsuitgaven). De studie presenteert de verdeling van de druggerelateerd overheidsuitgaven (illegale drugs, alcohol en psychoactieve medicatie) over de vier traditionele pijlers van het drugsbeleid: preventie (1.24%), hulpverlening (76.5%), harm reduction (0.24%) en veiligheid (21.67%). Voor de overheidsuitgaven illegale drugs wordt eveneens een vergelijking over de tijd heen gemaakt, en een vergelijking met andere landenstudies. Deze cross-country studie werd weliswaar bemoeilijkt door conceptuele en methodologische verschillen tussen de diverse landen.

De tweede studie onderzoekt de overheidsuitgaven voor illegale drug en alcohol behandeling in ziekenhuizen voor 21 EU lidstaten. Een uniforme methodologie met data van de Eurostat database (anno 2010 data) werd toegepast om een valide landenvergelijking te bekomen. De totale overheidsuitgave voor hospitalisatie van illegale drugs en alcoholmisbruik wordt gepresenteerd voor 21 EU lidstaten. De studie bevestigt de hogere overheidsuitgaven voor alcohol in vergelijking met illegale drugs, bovendien wordt een grote verscheidenheid tussen de verschillende lidstaten waargenomen. De variatie wordt onder meer verklaard door factoren zoals de ligdagprijs, de organisatie van drughulpverlening, culturele en sociale normen ten aanzien van alcohol- en druggebruik,...

De derde studie focust zich op de kosteneffectiviteit van alcohol interventies. In eerste instantie, wordt de kosteneffectiviteit van het Belgisch alcoholbeleid (anno 2008) geëvalueerd. Het WHO “cost-

effectiveness modelling framework” werd gehanteerd om het effect van alcoholinterventies op de gezondheid van de Belgische populatie te meten (uitgedrukt in “disability adjusted life years” DALY). De combinatie van zes interventies werd onderzocht: alcoholcontroles in het verkeer, media campagne rijden onder invloed, verhoogde accijnzen, advertentieverbod, beperking verkoopsuren en korte interventie door huisartsen. Het verbod op alcoholreclame wordt als meest kosteneffectieve maatregel beschouwd voor België, daarna volgen de interventies verhoogde accijnzen en een beperking van de openingsuren. In tweede instantie werd een landenvergelijking uitgevoerd, meerdere landen beschouwen de wetgevende interventies als meest kosteneffectieve strategie.

Ter conclusie, de studie naar overheidsuitgaven en kosteneffectiviteit (GCEA) zijn belangrijke instrumenten voor een economische evaluatie van het nationaal drugsbeleid. Er wordt namelijk informatie verstrekt aan de beleidsmakers voor de reallocatie van het drugsbudget, op deze manier dragen de studies bij tot een evidence-based beleid. Daarnaast stellen de cross-country studies (naar overheidsuitgaven en kosteneffectiviteit) ons in de mogelijkheid om het drugsbeleid van diverse landen te analyseren en te vergelijken. Weliswaar bestaat de uitdaging erin om de methodologische en conceptuele problemen te overstijgen in een landenvergelijking.

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INTRODUCTION

Resource allocation is considered to be one of the three economic functions of the government (besides macroeconomic stabilization and income redistribution). This function expresses the idea that a government has to provide welfare to its citizens and should in some circumstances do this by providing goods and (more often) services that its citizens demand (Musgrave & Musgrave, 1989; Escolano et al., 2015). Hence, this point of view confronts the government with choices about how many means should go to which different tasks. The resources in the public sector are mostly generated through taxes, one widely accepted standard is that public resources should be used in the most efficient and effective way, consistent with other core values (such as transparency, accountability, lack of corruption, etc.) (Mandl, Dierx & Ilzkovitz, 2008). In health economics, the term allocative efficiency is used to describe this distribution of resources among different programmes to achieve the maximum possible socially desired outcome for the available resources (Hutubessy, Chisholm, Edejer & WHO-CHOICE, 2003). A number of related methods have been developed to guide decisions (on distribution) about public spending. The two main methods of economic evaluation that are typically promoted for governments are the cost-benefit and cost-effectiveness analysis (Godfrey, 2006). Such studies are in keeping with the New Public Management movement's emphasis on efficiency and accountability in governmental operations (Osborne & Gaebler, 1992; Behn, 2001; Pollitt, 2003). The tools and ideals of evaluation research have been relevant for a number of areas (e.g. health care, crime, etc.) to evaluate policy choices (Godfrey, 2006). This dissertation contributes to the economic evaluation of drug policy in EU member states with a particular focus on the Belgian drug policy, by studying the public spending and cost-effectiveness of drug policy. The term "drug policy" must be understood as policy activities regarding legal and illegal drugs.

The economic evaluation of drug policy has been gaining momentum since the beginning of the 21st century. The EU drugs strategy (2013–2020) supports this evolution by stating that actions must be evidence-based and cost-effective (Council of the European Union, 2012). The European action plan to reduce the harmful use of alcohol 2012–2020 of WHO Europe also states that *"countries that are most active in implementing evidence-based and cost-effective alcohol policies and programmes will profit from substantial gains in health and well-being, productivity and social development"* (WHO, 2012, p5). Moreover, in view of the current economic crisis and the resulting austerity measures being implemented by governments across Europe, public expenditures have increasingly become a subject of discussion. This austerity has led to reductions in public spending in the categories of health, social protection and public order and safety, consequently this had an impact on the public financing of

drug-related initiatives (EMCDDA, 2014). This puts a new premium on measuring and valuing the “return on investment” of government expenditures for drug policy interventions (Maynard, 2004). Therefore, economic evaluation studies are necessary to provide important information to aid decisions about drug policies.

The public expenditure studies, with an estimation of public spending on drug control and drug problems, are considered as an intermediate stage in economic evaluation. These public expenditure studies are an important step for the economic evaluation of drug policy interventions (EMCDDA, 2008; Vander Laenen, Vandam, De Ruyver & Lievens, 2008), since they could be used for three purposes: (1) evaluation of the drug policy expenditure mix, (2) comparison between public spending and policy pronouncements, and (3) to study the evolution of public expenditures on drugs over time. Firstly, it provides insight into how drug expenditures are composed and what the public authorities’ so-called “policy mix” is (Reuter, 2006; Vander Laenen et al., 2008). The drug phenomenon is multidimensional and entails that authorities from all levels of government (national, regional and local), all from their own policy domains and with their own competencies, contribute to the realisation of the drug policy. Therefore it is indispensable to list the expenditure of the competent authorities in the pursuance of their policy options. Secondly, in view of the growing demands for accountability and evidence-based policy, a public expenditure study could show whether the government’s stated priorities for drug policy are mirrored in their actual expenditures. Most countries of the EU implemented an integral and integrated drug policy, in which several policy levels and domains are involved (EMCDDA, 2008; Vandam, Colman, Vander Laenen & De Ruyver, 2010). In Belgium, the Federal Drug Policy Note of 2001 (Belgian Federal Government, 2001) and the Joint Statement of the Inter-ministerial Conference on Drugs in 2010 (Inter-ministerial Conference on Drugs, 2010) also pursues an integrated and global drug policy. Moreover, these documents state that prevention gets the highest priority, followed by treatment for those people who come into problems by their drug use. A penal intervention should be considered to be an “ultimum remedium” or final remedy towards drug users, in fact repression should be directed towards trade/commerce in drugs and drugs production. These official policy pronouncements should be compared with the country’s drug budget in order to see whether spending matches the rhetorical priorities. Thirdly, a time analysis of the public expenditures may provide a sense of historical context and reveals changes in drug control strategies. The public expenditures of a country can be tracked over time alongside various outcomes. For example, the impact of drug policies and/or expenditures on problem indicators (e.g. prevalence of illegal drug use) could be measured.

It is clear that research into public expenditure is important to meet the requirements of an evidence-based policy, nevertheless public expenditure studies do have their limitations too. External expenditures – defined as expenses incurred indirectly by society as a result of substance use – and private costs are excluded in a public expenditure analysis (Kopp & Fenoglio, 2002). Consequently, no information is available on the public and private financing mix of drug policy (and the private financing mechanisms such as the patient cost of hospitalisation). Only a social cost analysis can provide the total social cost of drugs in a given society, and this social cost study may provide policy recommendations to reallocate drug budgets in accordance with the (health) impact of the different types of drugs (McDonald, 2011).

Other evaluation methods such as cost-benefit and cost-effectiveness analysis¹ hold a strong relationship with the public expenditure study, because they cannot be completed without the estimation of public spending on drug policy. In the economic evaluation studies, the public expenditures serve as the independent variable and outcomes (e.g., OD deaths) as the dependent variable. For example, the cost-effectiveness of alcohol prevention and treatment models has been assessed by a number of cost-effectiveness analysis (CEA) studies (e.g. Månsdotter, Rydberg, Wallin, Lindholm & Andréasson, 2007; Raistrick, Heather & Godfrey, 2006; Tobler & Stratton, 1997). These CEA studies compare the relative costs as the health gains of different interventions, therefore they are an important aid to public health decision-making. However these studies are not able to present a sectoral perspective; a sectoral CEA compares a range of interventions in order to find the optimal mix of interventions (Hutubessy et al., 2003). The Generalised Cost-Effectiveness Analysis (GCEA) is most useful to guide resource allocation decisions with an intervention mix that maximises health for a given set of resource constraints, since the costs and effectiveness of multiple interventions are compared (Edejer et al., 2003). The cost-effectiveness of a drug policy mix has been studied with this GCEA². Using this GCEA it is possible to simulate the most cost-effective drug policy mix of a country and to evaluate the current drug policy. Firstly, GCEA studies measure which mix of government interventions is likely to produce the greatest effectiveness in terms of costs. To this end, the intervention strategies to reduce the burden of hazardous alcohol use or illegal drug use or tobacco use are evaluated by their comparative impact on population-level health. Secondly, using a GCEA, the interventions are evaluated with respect to a counterfactual of “doing nothing” (Murray, Evans, Acharyan & Baltussen, 2000) and this null scenario provides information for decision-makers on what could be achieved if they reallocated the expenditures for drug policy (Edejer et al., 2003).

The primary focus of this dissertation is the economic evaluation of drug policy, we evaluate the public spending (on drug policy and substance abuse treatment in hospitals) and cost-effectiveness in

different European countries³. In addition, the Belgian drug policy serves as important case study for this economic evaluation, with a public expenditure study on drugs (in the first study of the dissertation) and a GCEA on alcohol interventions (in the third study of the dissertation). The Belgian setting is an interesting case from a public management point of view. European countries, including Belgium, are confronted with a high burden of disease due to legal and illegal drugs: a 9.2% of the disability adjusted life years (DALYs) – years of life lost due to either premature mortality or to disability – is caused by alcohol, 12.2% by tobacco and 1.8% by illegal drugs (Rehm, Taylor & Room, 2006). Moreover, in the context of the social cost of the harmful use of alcohol, Belgium is even confronted with higher costs (2.5% of GDP in 1999; Degreef, Pacolet & Bouten, 2003) than the European average (1.3% of the GDP in 2003; Rehm, Shield, Rehm, Gmel & Frick, 2012). At first sight, these high costs could not be ascribed to the epidemiological situation, since the prevalence of problematic alcohol consumption and illegal drugs⁴ is similar to the European average (Gisle et al., 2010). Other factors should be taken into account to explain the high social cost on alcohol. Therefore, an economic evaluation of the Belgian drug policy is recommended. This evaluation may indicate room for improvement in public spending on drug policy and may identify how the alcohol-attributable burden could be avoided if cost-effective interventions were implemented.

Some aspects of drug policy can be studied within a single country (e.g. prevention interventions in different secondary school classrooms); however, many important dimensions of policy operate at the national level, making cross-national comparisons of both policies and problem severity important. Three purposes are distinguished for undertaking a cross-country comparison in health policy: learning about national policies; learning why they take the forms they do; and learning lessons from these policy analyses (for the application in other countries) (Marmor, Freeman & Okma, 2005). There is a growing body of cross-country comparisons on health policy (Cacace, Ettelt, Mays & Nolte, 2013), and these comparative studies have also gained attention from drug policy analysts. Different approaches have been acknowledged to compare alcohol policies between countries: government spending, cost-of-illness, consumption and patterns of use, burden of disease, composite harm indices, generalised cost-effectiveness analysis and alcohol policy index (Ritter, 2007). The public expenditure and GCEA approach are both distinguished as interesting tools to develop comparisons between countries (Ritter, 2007; Reuter, 2006; Kopp & Fenoglio, 2003). Therefore, both types of cross-country comparisons have been conducted in this dissertation. The first study of this dissertation conducted a cross-country comparison on public expenditures for drug policy; and the second study compared the public spending on hospital treatment for 21 EU member states⁵. A cross-country comparison on government spending allows us to calculate the proportion of a country's gross domestic product that is spent on drug policy. Moreover, a comparison with other countries makes it possible to view the

different options in drug policy and explore the correlation between different drug policies and public expenditures. The third study of the dissertation investigates if GCEA studies could be used in a cross-country comparison to compare the cost-effectiveness of alcohol policies in different countries. An analysis of different government intervention mixes may enhance the comparison of alcohol policies between countries. In fact, a cross-country comparison of the cost-effectiveness of alcohol interventions would enable to monitor alcohol interventions with benchmarking information and this may potentially improve the effectiveness and cost-effectiveness of alcohol policy (Ritter, 2007). Despite the potential of the public expenditure and GCEA study for a cross-country comparisons, it should be stated that cross-country comparisons are encountered with difficulties because of conceptual and methodological differences across countries (Ritter, 2007; Reuter, 2006). During this dissertation, the methodological issues for the public expenditure and GCEA in a cross-country comparison are discussed more in detail.

Overall, the three studies in this dissertation contribute to the economic evaluation of drug policy. The first study “Drugs in Figures III” is conducted to provide insight into the composition of the Belgian drug policy expenditures mix. This study measures the public expenditures (anno 2008) of Belgian drug policy (illegal drugs, alcohol, tobacco and psychoactive medication). The financial data are collected by the top-down and bottom-up approach, followed by the procedure of data processing (drug specific data, a proration technique and unit expenditure). The study presents the percentage of government money for drugs that is spent on the traditional four pillars of drug control: prevention, treatment, harm reduction and law enforcement (Reuter, 2006). These results show that drug policy expenditures are not necessarily in alignment with the priorities, strategic goals and objectives of the Belgian drug policy. Furthermore, a cross-country comparison was infeasible because of the conceptual and methodological differences in the national public expenditure studies.

During the first study, it has become clear that a uniform methodology is necessary to estimate the public expenditures on legal and illegal drugs in different countries. Therefore, the second study searched for a uniform methodology across the EU member states in order to allow a valid cross-national comparison. Based on the international database of Eurostat, consolidated data were retrieved to measure government spending for the hospital treatment of illegal drug and alcohol abuse in 21 EU member states. The public drug expenditures on hospitalisation are estimated by multiplying the average cost per hospital day by the number of hospital days for treating illegal drug or alcohol disorders. This study showed a large variation in public spending on substance abuse treatment in hospitals. This variation is explained by factors such as the hospital cost per day, the organization of substance abuse treatment, cultural and social norms regarding substance use, etc.

The results from the first and second study indicated that public expenditures for alcohol treatment exceed that for illegal drug treatment (even the treatment expenditures per-dependent user)⁶. In Belgium, at least 75 % of the treatment expenditures is for alcohol, therefore it might seem warranted to investigate if the Belgian alcohol policy could improve its cost-effectiveness. As third study, a GCEA have been conducted to measure which mix of government interventions are likely to produce the greatest cost-effectiveness. The study starts with the selection of interventions that reduce alcohol-attributable harm and the effect of each intervention derives from the alcohol literature. Furthermore, Belgian data on mortality and prevalence of hazardous alcohol use are collected. The cost-effectiveness of six alcohol was investigated for Belgium with the WHO cost-effectiveness modelling framework. The costs are assessed in Euros for the year 2008 and the intervention effects are expressed in disability adjusted life years (DALYs). The optimal intervention mix for alcohol control in Belgium is presented: the best combination in case of two policy options is increased taxation and advertising ban; and the brief intervention in primary care should be implemented as a third policy intervention. Furthermore, the cross-country comparison shows that legislative interventions (increased taxation, advertising ban and reduced opening hours), in comparison with other interventions such as brief intervention and random breath testing, are the most cost-effective strategies across countries. The results of this cross-country comparison with GCEA should be interpreted with caution, therefore the conceptual and methodological differences across studies are explained.

The three studies are presented as three consecutive chapters in this dissertation. They are followed by a conclusion, policy recommendations and suggestions for future research.

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ENDNOTE

¹ The Cost-effectiveness analysis (CEA) is a form of economic analysis that determines the costs and outcomes (effects) of an activity (or similar alternative activities). The Cost-benefit analysis (CBA) is an analysis in which the economic and social costs and benefits of a policy/medical care are considered. For the allocation of funds in a CBA, the general rule is that the ratio of the marginal benefit to marginal cost should be equal to or greater than 1 (Porta, 2008).

² Most GCEA studies focus on alcohol (Chisholm, Rehm, Van Ommeren & Monteiro, 2004; Cobiac, Vos, Doran & Wallace, 2009; Holm, Veerman, Cobiac, Ekholm & Diderichsen, 2014; Lai, Habicht, Reinap, Chisholm & Baltussen, 2007), nevertheless the GCEA studies of Lai et al. (2007) and Chisholm, Doran, Shibuya & Rehm (2006) measured the cost-effectiveness of tobacco and/or illegal drug interventions.

³ During the cross-country comparisons, we focus on European countries because of the health care systems. The proportion of public financing of health expenditures are somewhat comparable in the EU countries (governments in the EU-21 finance on average 73% of the health expenditures). This differs from countries such as the United States where less than 50% of health spending is publicly financed (Eurostat, 2013).

⁴ In a 2008 Belgian health survey 10.3% of the participants reported a problematic alcohol consumption. The same survey reported a 5% year prevalence for cannabis and 1.5% for other illegal drugs (e.g. cocaine, amphetamines, ecstasy, heroin, etc.) (Gisle et al., 2010). (These prevalence rates remained stable between 2008 and 2013; Gisle & Demarest, 2014)

⁵ This study used international databases to facilitate cross-country comparisons that could highlight the impact of substance abuse on public health budgets. The cross-country comparison is restricted to hospitals, since data were unavailable for other types of treatment providers.

⁶ However, the treatment expenditures per dependent user (minimum 780 euros per alcohol dependent and maximum 395 euros per illegal drug user) should be interpreted with caution, since the user estimates are not completely comparable. The National Health Interview Survey (IPH, 2010) reports data on alcohol in terms of weekly overconsumption (2008: weekly overconsumption for 7.9% of the population, aged 15 years and older) and the year prevalence is reported for illegal drugs (2008: year prevalence of 5.1% for cannabis and 1.5% for other drugs, aged 15 years to 64 years).

STUDY 1

DRUGS IN FIGURES III: STUDY OF PUBLIC EXPENDITURES ON DRUG CONTROL AND DRUG PROBLEMS¹

ABSTRACT

Background: There is growing interest in public expenditure studies with regard to drug policy. These studies have a potential role on multiple levels. They provide insight into how drug expenditures are composed and what the public authorities' so-called 'policy mix' is. Moreover, in view of the growing demands for accountability and evidence-based policy, these studies show whether the government's stated priorities for drug policy are mirrored in their actual expenditures. Finally, the potential role of public expenditure studies increases with a comparison over time and across countries. These comparisons may provide important insight into the dynamics of drug policy. The present study serves as both an important case study – in this case of Belgian public expenditures – and also as a model to explore the potential role(s) of public expenditure studies more generally.

Methods: This paper measures the public expenditures (anno 2008) of Belgian drug policy. It advances beyond two previous studies (De Ruyver et al. 2004, 2007) in two distinct ways: by carrying out a new and more refined estimation of public expenditures on *illegal* drugs and by providing a first estimation of expenditures concerning *legal* drugs (tobacco, alcohol and psychoactive medication). Drugs in Figures III combines two methods of data-collection for the inventory of public expenditures. The top-down approach starts from the resources made available by the different public authorities involved in drug policy. The bottom-up approach starts from activities taking place in the field and traces the money flow back to the public authorities' funding.

Results: The results of 'Drugs in Figures III' make two important contributions. Firstly, the study presents the percentage of government money for drugs that is spent on the traditional four pillars of drug control: prevention, treatment, harm reduction and law enforcement. Secondly, public expenditures on illegal drugs anno 2008, put in comparative perspective with the previous estimations of 'Drugs in Figures II', gives insight into the evolution of public expenditure on drugs over time. The potential third level being a cross-country comparison encounters more difficulties because of

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STUDY 1

conceptual and methodological differences in expenditure measurement across countries. The cross-country comparison shows that a uniform methodology is necessary to estimate the public expenditures in different countries, studying expenditures for legal and illegal drugs.

Key words: Public expenditure, drug policy, illegal and legal drugs, cross-country comparison

1. INTRODUCTION

Public expenditure studies with regard to drug policy are gaining momentum. Since the beginning of the 21st century studies on public expenditure have been conducted in Australia, Belgium, Luxembourg, the Netherlands, and Sweden, among other countries (Origer, 2002; Postma, 2004; Rigter, 2006; Ramstedt, 2006; De Ruyver et al., 2004, 2007; Kopp & Fenoglio, 2003, 2006; Moore, 2008; Mostardt, Flöter, Neumann, Wasem, & Pfeiffer-Gerschel, 2010). The United States of America has a long tradition of studying federal (as opposed to national¹) public expenditures on illegal drug control with the Office of National Drug Control Policy (ONDCP) annual Budget Summary report (federal spending only; ONDCP, 1989-2011), augmented just for the years 1990-1991 with an attempt to measure state and local spending (ONDCP, 1993). The National Center on Addiction and Substance Abuse (CASA) released complementary studies of the total budget impact of legal and illegal drugs. They were called the 'Shoveling up' studies (CASA, 2001 & 2009) because they pointed out that more than 95% of the \$467.7 billion annual total was spent mitigating the consequences of substance abuse rather than treating or preventing it. Indeed, over 70% was spent just on healthcare for conditions to which untreated addiction contributes. These diverse public expenditure studies have one thing in common; they are all an important step for the economic evaluation of drug policy interventions (EMCDDA, 2008; Vander Laenen, Vandam, De Ruyver & Lievens, 2008).

In this contribution, three important roles for public expenditure studies are discussed in the monitoring and economic evaluation of drug policy interventions. The first investigates the country's drug budget in a single time period, and compare it to official policy pronouncements to see whether spending matches the rhetorical priorities. On a second level one may examine expenditures over time within one jurisdiction; this provides a sense of historical context and the changing face of drug control. These first two levels stress that a public expenditure study is of value for decision makers in their own country. Another way to get a sense of perspective on one's own drug policy is to make comparisons with other countries. The third level considers the potential role of public expenditures studies in a cross-country comparison (Reuter, Ramstedt & Rigter, 2004).

Understanding current public expenditures enables us to evaluate the commitments of governments in the drug policy field. A public expenditure study indicates the public resources dedicated to drug policy and shows whether the government's stated priorities for that drug policy are mirrored in its budget. A drug budget provides insight into how the drug expenditures are composed or what the public authorities' 'policy mix' is. Consequently, the prevailing balance between the various sectors of drug policy (prevention, treatment, harm reduction and law enforcement) becomes visible (Moore,

2005; Vander Laenen et al., 2008). Likewise, it is possible to examine the division of expenditures between legal and illegal drugs.

The public is often interested not only in whether spending matches announced priorities, but also in whether both are aligned with what the scientific evidence suggests are the most cost-effective programmes. For some types of programmes, cost-effectiveness can be studied at the micro level, e.g. by randomly assigning dependent users to different treatment programmes or classrooms to different prevention programmes. However, other policies and programmes operate at the national level, which makes research designs more difficult, and sometimes not possible at all. Hence, a complementary analytic approach is to see whether changes in distributions of funding are predictive of changes in problem outcomes.

This can be done with time series methods for a single jurisdiction. So, on a second level, the public expenditures of a country can be tracked over time alongside various outcomes. This may allow for the measurement of the drug policies' and/or the expenditures' impact on problem indicators. However, if there is considerable stability over time in a country's expenditures (the institutional framework of drug policy stays the same and the drug expenditures do not undergo significant changes), then a cross-country comparison could possibly provide more insight.

That is, sometimes one can get more variation in the independent variables (budget, policy) by comparing different countries than by comparing one country at different points in time, and that variation can be used in several ways (MacCoun and Reuter, 2001). The variation may provide important insight into the dynamics of drug policy across nations. For example, it has been observed that enforcement dominates the budget in most public expenditure studies on illegal drugs. There are various plausible explanations. The imbalance could stem from a political decision to invest more on law enforcement. Or law enforcement may simply involve more expensive activities. Or the cause could lie in the realities of drug markets (since the drug markets activity has an effect on the public sector effort to enforce prohibitions, and this may determine the enforcement expenditures) (Reuter, 2006).

Secondly, a cross-country comparison could enable individual nations to assess whether better performance could be expected (Reuter, 2006). A country having high treatment expenditures per problematic user, in comparison with other countries, could indicate the use of inefficient treatment programmes or a (mental) health care system with limited cost-effectiveness.

Thirdly, a comparison with other countries makes it possible to view the different options in drug policy and explore the correlation between different drug policies and public expenditures. A cross-sectional study involves the observation of a set of public expenditures from different countries at a single point in time. A panel study, on the other hand, uses variation over time and across countries in drug policy spending. Such methods may predict the impact of a change in drug policy on the public expenditures for prevention, treatment, enforcement or harm reduction (Lievens & Caulkins, 2010). For example, the Netherlands are known for tolerant drug policy, and from this point of view, one would expect less expenditures for enforcement in comparison with other countries. However, Rigter (2006) shows that 76% of the drug budget is spent on enforcement in the Netherlands. The unexpectedly large investment in enforcement by the Dutch government has several explanations. The public and political view has generally been 'antidrug' despite making a partial exception for cannabis; also, the country is a hub of international drug trading routes, just as it is a hub of international trade of all sorts (Rigter, 2006). This case shows us that there is not necessarily a correlation between a tolerant drug policy and lower enforcement expenditures.

In order to explore the potential role(s) of a public expenditure study described above, we will use the results of a study ('Drugs in Figures III') of the public expenditures of the Belgian drug policy for the year 2008². To this end, the main questions addressed are: a) What is the composition of the Belgian drug policy mix? b) Which evolutions took place in the field of Belgian public drug expenditures (2004 versus 2008)? and c) What does the cross-country comparison tell about the dynamics of drug policy across nations? Finally, the answers to these questions are used to conclude if a public expenditure study can fulfil its potential role.

The chapter has been organized in the following way. The first part deals with the methodology used in the 'Drugs in Figures III' study³; it describes the approach used to identify, measure and classify public expenditures. The next section outlines the results; the estimate of Belgian public drug expenditures will be presented and compared over time and across countries. Finally, the implications of these findings are discussed by referring to the three important roles of a public expenditure study.

2. METHOD

An analysis of public drug expenditure studies in Europe (Vander Laenen et al., 2008) indicates that conceptual and methodological frameworks vary across these studies. With regard to the conceptual field, there is no global definition that determines the scope of public drug expenditures. This enhances the risk of wrongly including spending that should not appear in the budget, and wrongly

excluding spending that should appear (Walsh, 2004). From this point of view it is important to define which areas of expenditure lie within or beyond the scope of a public expenditure study. Secondly, the methods for estimating government drug policy expenditures vary from study to study. Different methodological steps and choices are possible and have their effect on the figures. A comparison over time or across countries asks for a single and clear methodology used in a uniform manner to avoid 'measurement error' (Murphy, Davis, Liston, Thaler & Webb, 2000). Therefore, it is worthwhile to describe in some detail the concepts used in the study, as well as the approach taken to data collection and data processing.

2.1. Conceptual framework

This third Drugs in Figures study uses the same definition for public expenditure as the two previous studies: *"the composition of the drug budget as an estimation of public authorities' expenditures on the drug policy"* (De Ruyver et al., 2007, p.31). The drug budget of the public authorities is analysed at each level of competency (national, regional, provincial and local) for the different policy domains (prevention, treatment, harm reduction and law enforcement).

This study focuses on the direct nature of the public expenditure: *"investments or budget lines of public authorities for actions expressly and directly aimed at implementing drug policy"* (Vander Laenen et al., 2008, p. 26). This differs from, for instance, the CASA studies mentioned above which also included other types of spending (e.g., healthcare provided to treat sequelae of untreated drug use). Consequently, external expenditures related to the consequences of drug use are not included in the public expenditure analysis. Examples of excluded expenditures are policing expenditures for property and violent crimes resulting from drug use or expenditures for treatment of lung cancer due to smoking. Furthermore, the definition of public expenditure already indicates that private expenditures are excluded. This means that the spending of individuals and private organizations⁴ is not measured. A corollary merits stating explicitly. Under this conceptual framework, the total social cost is not measured; the public expenditure is one element of the social cost of the drug problem, but it is not the entirety of social costs.

2.2. Methodological framework

This study attempts to refine the methodology of 'Drugs in figures I and II' (De Ruyver et al., 2004, 2007) in order to carry out a new estimation of public expenditures (anno 2008) on illegal drugs and a first estimation for legal drugs (tobacco, alcohol and psychoactive medication⁵). The methodology consists of three phases: data collection, data processing and data classification.

Data collection: top-down and check on top-down

In order to collect data, both a top-down and bottom-up approach are applied. The “top-down approach” is a method that starts from the resources made available by the different public authorities involved in drug policy. First, the public authorities are identified (De Ruyver et al., 2004, 2007). Afterwards, the public authorities’ drug budgets are collected and analysed. This top-down approach starts with an analysis of the budget lines of the public administrations. The bottom-up approach is an approach that starts from the activities in the field and traces the money flow back to the public authorities funding.

In the study, 98.45% of the identified expenditures comes through the top-down approach. Top-down data, that come from official accounting documents such as national budgets, may be more valid for the study, since these data are audited by the Court of Audit and therefore are partially protected from political pressure. Uncertainty arises about the data available from the bottom-up approach, although their impact on the results (1.55%) is limited. These public expenditures come from organizations that depend on the government for most of their funding.

Data processing: Drug specific Proration technique & Unit expenditure

The rough financial data are collected during the first phase, followed by the procedure of data processing. In line with the previous Drugs in Figures studies, three methods are distinguished: drug specific data, a proration technique, and unit expenditure. In the study, 75.85% of the identified expenditures is processed by the unit expenditure calculations, 15.48% by proration technique and 8.67% is drug specific. These methods have several advantages, but also a couple disadvantages that are listed below.

For the drug specific methodology, no further calculations are necessary, because the expenditures are exclusively used for drug policy. The other methods are used for drug programmes that are embedded within broader budget categories. This means that a process must be followed to ascribe a portion of that broader budget category to the drug programme. Typical approaches are the proration technique or unit expenditure calculations (Van Malderen, Vander Laenen & De Ruyver, 2009). The proration technique is for example used for estimating the expenditure on enforcement by police, judicial authorities and customs. The expenditures of the local police are calculated by multiplying the total local police budget by the fraction of all offences that are offences concerning violations of drug laws. In some cases the methodology of unit expenditure is preferred, because it simplifies the calculation⁶. For example, the public drug expenditures on hospitalisation are estimated by multiplying

the average expenditure for hospitalisation per day by the average number of days that drug users are hospitalised.

The main disadvantage of the proration method is that it can lead to distorted figures, because this methodology assumes that, for example in the case of law enforcement, all criminal activity has the same unit cost. However, a number of studies (e.g. Aos, 2006; Carey, 2005) have documented the common sense notion that the cost per arrest varies widely across offence types. In Washington State the average cost of an arrest varies from 31,648 dollars for murder to 5,370 dollars for drug offenses (Aos, 2006). The difference in the cost of arrest by offense is not taken into account in the proration method and consequently the amount of drug expenditures could be exaggerated. They are likewise exaggerated to the extent that the police do things other than arrest criminals; presumably some portion of policing expenditures are better thought of as allocated to traffic control, order maintenance, and emergency response, not to arresting people, and so do belong in the aggregate pool that is prorated by the relative number of arrests by crime type. The results should also be taken with caution since for the underlying aggregate expenditure data were provided by interested institutions/actors, leading to a possible contestation of the reliability of those data. Finally these examples show that the drug budget is a fragile construction. The results of the public expenditure studies can only be estimations, and the quality of the studies is only as good as the quality and timeliness of the available data (Vander Laenen et al., 2008).

Classification

The classification of public expenditure allows expenditures to be classified according to their goal, and this allows an insight into the 'policy mix' of the drug policy. The classification system of Reuter (2004) is applied: prevention, treatment, harm reduction and enforcement. In the studies of Ramstedt (2006), Rigter (2006) and Moore (2008) the four conventional categories have also been used. The addition of a fifth category "other" in this study is required because some of the expenditures could not be assigned to one of the four pillars of drug policy. The following expenditures are added, amongst others, to the category "other": European School Survey Project on Alcohol and Other Drugs and contribution to Pampidou Group⁷.

3. RESULTS

3.1. One time period: comparison across sectors and to policy pronouncements

Numeric results

In 2008, Belgian public authorities spent between 655,473,287 Euros and 1,294,698,299 Euros on drug policy (for illegal drug, alcohol, psychoactive medication and tobacco), with a best estimate⁸ of 975,085,793 Euros. A comparison across sectors is made for illegal drugs, alcohol and psychoactive medication in table 1⁹ and the comparison across sector for tobacco policy is presented separately in table 2.

Table 1: Estimated drug policy expenditures (illegal drugs, alcohol and psychoactive medication), Belgium, 2008 (rounded million Euros).

Category	Low estimate	High estimate	Baseline	Baseline fraction of total expenditures (%)
Prevention	12	12	12	1.24
Treatment	438	1036	737	76.5
Harm reduction	2.3	2.3	2.3	0.24
Enforcement	188	229	209	21.67
Other	3.4	3.4	3.4	0.35
Total	644	1283	964	100

Table 1 illustrates that treatment accounts for 76.5% of the total drug policy expenditures, and enforcement expenditures represent about one-fifth (21.67%). Prevention (1.24%), harm reduction (0.24%) and other policy activities (0.35%) are minor components of spending. For the category treatment there is a very wide range between the low and high estimate, because the expenditures for the hospitalisation sector depend on the inclusion or exclusion of hospitalisation costs for secondary diagnoses of substance abuse/dependence. Further analysis shows that at least three-quarters¹⁰ of the treatment expenditures is for alcohol. If the expenditures for illegal drugs are analysed separately¹¹, the policy mix changes to: 49.14% treatment, 45.09% enforcement, 3.85% prevention, 0.79% harm reduction and 1.14% other. Conversely, for alcohol, the domination of treatment spending is that much greater.

With regard to illegal drugs, the underlying idea of the Belgian federal drug policy note of 2001¹² was that prevention should be the highest priority, followed by treatment, with repression as a final resort.

Contrary to those stated policy intentions, the most substantial expenditures relate to treatment, followed by enforcement and then prevention and harm reduction.

Table 2 presents the expenditures for the tobacco policy and shows that enforcement is the largest expenditure (68.88%), treatment with 18.74% is second in rank and prevention accounts for 11.54%.

Table 2: Estimated tobacco policy expenditures, Belgium, 2008 (rounded million Euros).

Category ¹³	Expenditures	Fraction of total expenditures (%)
Prevention	1.3	11.54
Treatment	2.2	18.74
Enforcement	7.9	68.88
Other	0.1	0.85
Total	11.5	100

At first, it seems a remarkable result that enforcement dominates the budgetary pie of tobacco policy. Part of the explanation is that tobacco policy is not entirely *laissez-faire*; tobacco smoking is prohibited in workplaces, public spaces, restaurants,... and the management of that prohibition (or regulation) requires financial means. However, the larger explanation is that tobacco enforcement's relative share is so large primarily because treatment spending is so small. The treatment expenditures are rather limited because the reimbursement of tobacco dependence treatment is restricted to patients who are pregnant¹⁴. Furthermore, hospitalisation costs for tobacco are not included because spending on treatment for consequences of drug use (such as lung cancer in the case of tobacco) is viewed as an external expenditure and so is excluded from the study.

Since 2004, the Belgian tobacco policy officially tries to transcend the legal framework and a predominant repressive approach by focusing on prevention and on treatment of dependence (Federal plan tobacco control, 2004). The expenditures tell another story, however, since the biggest investments are still made to ensure compliance and to enforce the laws prohibiting the sale and distribution of tobacco products to minors, smoking bans, tobacco advertising, etc.

Interpretation

In an ideal world the drug budget should support the announced policy, and at a superficial level one might expect the highest priorities to receive the largest budget allocations. But these examples show that Belgian drug policy in practice fails to align programme resources with its announced priorities,

strategic goals and objectives. Carnevale (2008) draws attention to the fact that the administration must ensure a match between the *goals* of the drug control strategy and the budget passed to support it. He even goes one step further by claiming that there should be a consistency between funding and the *effectiveness* of interventions. The consensus in the academic literature is that “treatment works”, and many studies conclude that treatment produces social benefits that exceed its programmatic costs (Gerstein et al., 1994; Rajkumar and French, 1997; Cartwright, 2000; Harwood et al., 2002; Belenko et al., 2005). For example, the study of Caulkins et al. (1999) indicates that treatment is more cost-effective than school-based prevention at reducing cocaine consumption. Another study found that the treatment of heavy (cocaine) users is more cost-effective than supply-control programmes (Rydell, Caulkins & Everingham, 1996). These studies assessed cost-effectiveness at the margin; that is, they addressed how the next million dollars might best be spent. So strictly speaking they do not directly inform what the optimal allocation shares are. However, they suggest that from an effectiveness point of view, an optimal drug policy should spend more on treatment rather than enforcement, as compared to the status quo. Within this framework, the Belgian drug policy in 2008, with high expenditures for treatment, follows science rather than policy. However, this is a statement that needs to be handled with care, because a good match between funding and effective programmes is complex in different ways, which we will discuss in detail in the discussion section of the chapter.

3.2. Comparison over time

Numeric results

The expenditures of 2008 are being compared to the ones of 2004, derived from ‘Drugs in figures II’ (De Ruyver et al., 2007). The latter study, with a research scope limited to illegal drugs, found that over 50% of the public expenditures dealing with illegal drugs went to enforcement, approximately 40% to the treatment sector (harm reduction included), and the share of prevention amounted to just under 4%. It is difficult to make a comparison with the 2004 estimate, because of differences in research scope and methods of performing the calculations. Therefore, a new calculation is made for the year 2008 using the same proration techniques as in 2004. This provides a consistent comparison across years, allowing for direct comparisons between past and future budgets produced with the same methods. The public expenditures for illegal drugs are calculated by the previous method and are presented in table 3.

Table 3: Estimated drug policy expenditures (illegal drugs), Belgium, 2004 versus 2008

Category	Expenditures of 2004 expressed in 2008 monetary units ¹⁵		Expenditures of 2008	
Prevention	12,294,733	3.72 %	11,412,257	2.91 %
Treatment	130,909,594	39.58 %	133,557,858	34.05 %
Harm reduction	min. 340,628 ¹⁶	0.10 %	2,329,752	0.59 %
Enforcement	186,038,337	56.24 %	243,000,490	61.96 %
Other	1,190,329	0.36 %	1,890,813	0.48 %
Total	330,773,622	100 %	392,191,170	100 %

Between 2004 and 2008, the government expenditures for drug policy have increased quite substantially by more than 61 million Euros (18.57%), with 92.75% of this increase going to supply reduction programmes. Only small changes in expenditures are noticed for demand reduction. The main reason for the increase in treatment is rising hospital costs per day; for example, the average daily cost in psychiatric hospitals goes from 178.76 Euros to 242.04 Euros, while the number of drug dependence diagnoses declines.

In table 4 the expenditures for supply reduction are analysed for each level of the criminal justice system.

Table 4: Expenditures enforcement (illegal drugs), Belgium, 2004 versus 2008

Category	Expenditures 2004 ¹⁷		Expenditures 2008	
<i>Detection</i>	152,318,468	81.87 %	168,989,940	69.54 %
<i>Prosecution</i>	3,832,648	2.06 %	6,799,870	2.80 %
<i>Sentencing</i>	3,883,307	2.09 %	6,229,902	2.56 %
<i>Sentence execution</i>	21,836,579	11.74 %	57,430,379 ¹⁸	23.63 %
<i>Indefinable level of the criminal justice system</i>	4,167,335	2.24 %	3,550,399	1.46 %
Total	186,038,337	100 %	243,000,490	100 %

Increasing expenditures are observed for each level of the criminal justice system. Two factors have influenced this evolution. First, the general budget on each level has increased more than one would expect on the basis of inflation. Secondly, an upward trend in the number of recorded drug crimes is noticed: on the level of detection the number rises from 4.27% in 2004 to 4.53% in 2008, for

prosecution from 4.05% to 5.7% and for sentencing from 2.29% to 2.99%. Similar increases¹⁹ are revealed for two subcategories of the level of the sentence execution: the houses of justice and penitentiary.

Interpretation

The Belgian comparison over time shows changes in the drug budget, especially in the field of enforcement. This could indicate that drug policy has influenced the public expenditures. This is probably not the case since the Belgian federal drug policy note of 2001 remained applicable during the years 2004-2008, and no important changes were made in the national drug policy. A sequence of small decisions on several levels is responsible for the decreasing prevention expenditures and increasing treatment and enforcement expenditures²⁰. For example, the police reports on the offence 'illegal drug possession' and 'import/export illegal drugs' increased between 2004 and 2008. It is possible that the focus on drug tourism has enhanced the enforcement expenditures (Vander Laenen, De Ruyver, Christiaens & Lievens, 2011). Another explanation could be an increase in the fight against public (illegal) drugs nuisance (Ward, 2011). Finally, there may have been no change in enforcement policy per se, but an increase in arrests because of an increase in the level of the underlying criminal activity.

Secondly, the Belgian public expenditure study of 2004 warned that prevention is underfinanced. The 2004 study was used as an argument by the prevention sector to ask the government for more funding, a request that was not granted, as the 2008 study shows. The comparison over time shows that resources for prevention programmes not only did not grow; they actually decline, while resources for enforcement increase (by 29.01%). It seems that it was not possible or desirable for Belgium to change the (historical) drug policy mix and enlarge the pillar prevention over this period of four years. It is much simpler for a government to maintain the historical resource allocation than to carry out changes to the resource allocation mix (McDonald, 2011). Furthermore, the drug expenditures are always after-the-fact calculations based on decisions made by those competent public authorities and therefore they use data collected from budgets and/or accounting statement. The results of a public expenditure study may be useful for guiding future decisions, but it is not a decision forcing instrument (Reuter, 2006).

3.3. Cross-country comparison

A comparison with other public expenditure studies is difficult, because of the differences in the applied conceptual framework. For example, the studies of Sweden and the Netherlands take into

account a fraction of the reactive expenditures (spending related to the consequences of drug use, Moore, 2008). In table 5, 6 and 7 a cross-country comparison is provided²¹, but the estimates for Sweden, the Netherlands and Luxembourg are reorganized to match the conceptual framework of 'direct' expenditures. The conceptual differences are eliminated by excluding amongst others the expenditures for HIV/AIDS treatment to patients infected via IDU and drug related crimes. However, differences remain with regard to methodology and social welfare systems.

First, a comparison of the results of the global public expenditures for seven countries will be presented. Second, the drug expenditure mixes of four countries are studied.

3.3.1. Global public expenditures

Numeric results

In the first part of this cross-country comparison, the following indicators are examined: proportion of gross domestic product (GDP) and the expenditures per capita. Belgium's public expenditure on drug policy (illegal drugs) for the year 2008 amounted to 296 million Euros. On the 1st of January 2008, Belgium's population stood at 10,666,866 inhabitants and Belgium's GDP was 344.7 billion Euros. This means that public expenditure on drug policy represented 27.78 Euros per inhabitant or 0.09 % of the GDP.

Table 5: Cross-country comparison (illegal drugs)²²

Country	Year	Expenditure (million Euros)	Proportion of GDP(%)	Per capita (Euros)
The Netherlands (Rigter, 2006)	2003	1721 ²³	0.36	106.07
Germany (Mostardt, 2010)	2006	5144 - 6024	0.22 - 0.26	62.45 - 73.13
Sweden (Ramstedt, 2006)	2002	502 ²⁴	0.19	56.25
Australia ²⁵ (Moore, 2008)	2002 - 2003	770	0.17	39.20
Luxembourg (Origer, 2002 & 2010 ²⁶)	1999 2009	22 ²⁷ 38 ²⁸	0.11 0.1	51.54 77
Belgium	2008	296	0.09	27.78
France (Kopp & Fenoglio, 2006)	2003	907	0.06	15.04

The absolute amount of public expenditures in a country might be caused by the size and wealth of this country, e.g., because wages of police and treatment workers might tend to be higher in more affluent countries. So drug-related expenditure as a proportion of GDP is also relevant, because it takes into account that a richer country might invest more in drug control for a given size problem (Reuter, 2006). An analysis of this indicator and the expenditure per capita, tells us that the Netherlands, Germany and Sweden invest the largest share of GDP in drug policy, whereas France and Belgium are located at the bottom. Australian drug expenditures are situated between these extremes. It is difficult to draw conclusions for Luxembourg, since the proportion for public expenditures on illegal drugs of the GDP is rather low, although the expenditures per capita lean more towards Sweden and Germany.

As mentioned, we cannot compare U.S. expenditures directly, because the most comparable figures pertain only to federal spending. However, we can work the calculation in reverse. The average proportion of GDP across the seven countries in the table is about 0.175%. If the U.S. spent 0.175% of its \$14.5 trillion GDP on drug control, that would be about \$25 billion per year. That is considerably more than the federal government spends, but less than twice as much. So if state and local spending on drug control exceeds federal spending, as was the case back in 1990 and 1991 (ONDCP, 1993), the last time direct estimates were made, then the U.S. spends a larger proportion of its GDP on drug control than the average of the countries in the table. On the other hand, spending at a rate that matched the highest country in the table, the Netherlands at 0.36% of GDP, would require that the U.S. spend over \$50 billion per year on drug control, which is on the high side of guesses typical made about U.S. national spending.

Interpretation

It is clear that the public expenditure in Belgium and France is far from the level of expenditure in the Netherlands and (less) than half of the expenditures in Sweden and Germany. A possible explanation lies in the history of the countries' drug policy.

Both Belgium and France developed a drug policy at a later stage than countries such as the Netherlands and Sweden. Apart from the adoption of the international drug laws and regulations and accompanying expenditures for law enforcement, in Belgium and France, subsidies in the field of prevention or treatment remained scarce. Only after societal and political changes at the beginning of the 1990s, did the Belgian government start to develop a drug policy; its first drug policy note was written in the year 2001 (De Ruyver, Vander Laenen & Eelen, 2011). A similar story occurs in France.

The French government waited until 1999 to develop a triennial plan that defines priorities for action, objectives and specific measures (Collin, 2001).

The countries with high drug-related public expenditures have a longer history in drug policy. For example, Sweden transformed to a clear law-enforcement approach already at the end of the 1960s (Lenke & Olsson, 1996). The Dutch drug policy, regarded as liberal and tolerant, has its foundations in the early involvement of the Netherlands in the legal trade of coca and opium. Since 1960s the Netherlands viewed drug addiction as a social problem and they amended radically the Opium Act in 1976 (Chatwin, 2003). Germany's drug policy has a long standing history, and it is also progressive in comparison with other countries (Schroth, Helfer & Gonshorek, 2011). Furthermore, Australia has formed a framework of drug policy, with the principle of harm minimisation, since 1985 (Green, 2002). The development of an Australian drug policy can be situated in time between the Netherlands, Sweden and Germany on the one hand and Belgium and France on the other hand. This might explain why Australia has an average drug expenditure in comparison with the other countries.

This correlation between level of expenditure and longevity of formal national policy could be purely coincidence. It could also readily be a spurious correlation stemming from an omitted third variable, to use social science parlance; that is, countries with worse drug problems may both launch their formal policy sooner and spend more, on average. However, the correlation does also raise the provocative policy that formalizing a policy creates a bureaucratic tendency to grow budgets over time. So that even if the official policy adopts a lenient tone, the very existence of that formal policy may stimulate greater expenditures over time, perhaps including expenditures on enforcement. To be clear, no such causal inference can be supported by this simple cross-sectional comparison. But it is an interesting hypothesis that might merit empirical investigation in further work.

Stepping back from such generalities, one can at least say in conclusion, the combination of the cross-country comparison results and the drug policy history provides support for the following conjecture: the late development of the Belgian drug policy may have delayed growth in the financial investments in drug policy.

3.3.2. Drug expenditure mixes

Numeric results

A second way to conduct a cross-country comparison is by studying the drug expenditure mixes of different countries. As mentioned, the Belgian policy mix for illegal drugs consists of 49.14% treatment, 45.09% enforcement, 3.85% prevention, 0.79% harm reduction and 1.14% other. The level of spending per pillar is taken into account in Table 6 and 7. For the comparison, the countries that used the same policy categories (prevention, treatment, law enforcement and harm reduction) are included. The drug expenditure mixes of the four countries are presented in two separate tables. The policy mixes of the Netherlands and Australia are presented separately because it is not correct, from a methodological point of view, to compare them with the figures of Belgium or Sweden.

Table 6: Cross-country comparison (illegal drugs) for Sweden and Belgium³⁰

Country	Year	Prevention	Treatment	Harm reduction	Enforcement	Other
Sweden ²⁹	2002	1.6 %	35.5 %	0.2 %	62.7 %	/
Belgium	2008	3.9 %	49.1 %	0.8 %	45.1 %	1.1 %

Table 7: Cross-country comparison (illegal drugs) for the Netherlands and Australia

Country	Year	Prevention	Treatment	Harm reduction	Enforcement	Other
The Netherlands ³¹	2003	2.4 %	20.2 %	4.3 %	68.8 %	4.2 %
Australia	2002 -2003	23 %	17 %	3 %	55 %	1 %

First of all, harm reduction and prevention are the smallest sectors in each country, with the exception of prevention in Australia. Australia's spending on prevention appears to be higher than their expenditure on treatment or other countries' spending on prevention because its figures include school-based drug prevention programmes³². Those expenditures are not taken into account in the Belgian and Swedish study, due to lack of information about the proportion of drug prevention in school time. Furthermore, the Dutch expenditures for harm reduction are bigger than for prevention. This seems plausible because the Netherlands have consistently practiced a policy of harm reduction to drug problems (Chatwin, 2003).

Secondly, tables 6 and 7 also tell that the majority of spending is on enforcement, except for in Belgium. It has been assumed that supply control interventions absorb the great bulk of drug control

spending in punitive countries as the United States (Caulkins, 2009), but these results show that they also do in countries often associated with less hawkish policies, including the Netherlands and Australia. Belgium strikes the eye because of the slightly bigger amount of treatment expenditures in comparison with the enforcement expenditures. This is due in part to methodological differences and to differences in the health care systems in the countries. For example, the Dutch study used a methodology that probably underestimated the drug-related costs in hospitals³³. Consequently the expenditures for general health care are much lower in the Dutch study (general health care counts for 2.56% of the total treatment sector, in comparison with the Belgian proportion of 55.53%). Furthermore, the Swedish number of hospital days for a drug-related diagnosis is also less than in Belgium (Sweden: 60,900 and Belgium: 146,813).

Interpretation

It is hard to draw any conclusions in a cross-country comparison, given the uncertainties about the methodology. For example, the Dutch and German studies indicated high expenditures for the enforcement sector. Rigter (2006) found that 76% (adapted estimation in table 7: 68.8%) of the expenditures belong to this sector. The German study of Mostardt (2010) estimated that police, courts and prisons spend a minimum of 3.3 billion Euros (65.4%) and a maximum of 4.2 billion Euros (70%) on drug enforcement. This might indicate that countries with high expenditures for drug policy have, in comparison, a bigger sector enforcement. On the other hand, the proration techniques to calculate drug-related expenditures in the enforcement pillar vary in the studies. In the Belgian study, the proportion of police reports for 'illegal drugs' (1%) is applied on the general police budget. The Dutch study used the share (13%) of Opium Act offences in the total number of cases leading to detention verdicts in courts. A test is conducted where this Dutch proration technique is applied for Belgium. The Belgian share of drug offences in the total number of cases leading to imprisonment is 15.29 %. If this share is applied to the police budget, than the Belgian policy mix changes to: 79.18% enforcement, 18.64% treatment, 1.46% prevention, 0.30% harm reduction and 0.43% others. It is clear that different proration techniques can distort the cross-country comparison and it possibly explains the larger sector enforcement for the Netherlands.

Secondly, the different welfare security systems further complicate a comparison of countries' public expenditures. There are big differences between the welfare states, and this becomes clear in the various social expenditures (Cantillon, 2009). Social expenditures' proportion of GDP is for example much lower for Australia (16% in 2007) than for Belgium (27.3% in 2007). From this point of view, it is plausible that the Australian treatment expenditures are lower than the expenditures in the other countries in the cross-country comparison³⁴.

4. DISCUSSION

The ultimate goal of a public expenditure study is to improve drug policy. A preliminary clear view on the public expenditures is necessary to assist policy makers in setting priorities (Moore, 2008), because an appropriate drug policy should rely on the assessment of drug related public expenditure (EMCDDA, 2008). This paper investigated if a public expenditure study can fulfil the potential role of informing the decision makers on three levels. The results of 'Drugs in Figures III' show that the study passes for the first two levels. Firstly, the study provides insight into how the drug expenditures are composed and what the public authorities so-called 'policy mix' is. The study shows whether the government's stated priorities for that drug policy are mirrored in their expenditures. Secondly, the study gives insight into the evolution of public expenditures on drugs over time.

On a first level, the composition of a country's drug policy expenditures mix becomes clear during a comparison across sectors. From this comparison it is surprising to find that public expenditures on prevention are a fraction of the amount spent on treatment. This is particularly true for the prevention of tobacco and alcohol: only 9.52 % of the amount spent on prevention is spent for the prevention of tobacco and alcohol. Since further analysis shows that at least 75.59%³⁵ of the treatment expenditures is for alcohol, it might seem warranted to invest more in prevention, both from a cost-effectiveness point of view as well as from a social cost point of view. (The pattern of spending should consider the drug types that are the source of most harm to society, McDonald, 2011.) It seems that decision makers need the drug policy expenditures mix to monitor the balance of resource allocation, namely equality in the quantum of funds allocated to the various drugs and implementation sectors (McDonald, 2011).

The comparison of drug policy expenditures to policy pronouncements brings up that there is no match between government's spending and policy declarations in the Belgian case. The Belgian drug policy developed in a bottom up manner: it proceeds from the work field. Consequently, the public expenditures are more dependent on activities and initiatives in the field, and less dependent on the federal drug policy. This being said, the budget proportions should not necessarily match with priorities. There are several reasons why, even in an ideal world, central priorities may not be associated with the largest budget outlays. For one, the priorities may be pursued through a policy or a mandate, not a programme with a specific budget line. This is clearly the case in Belgian drug policy since only 8.69% of public expenditure on drugs is drug specific and thus retraceable as such in the budget lines. Another reason is that political statements of priority often represent directions of change, not absolute levels. So when a new administration makes a particular programme its priority, that may mean large percentage increases in spending on that programme, not that the programme's

level of funding will suddenly become the largest. In fact, the historical resource allocation formulae will not be fundamentally changed by putting into place a (new) policy drug note (McDonald, 2011).

The second level, a comparison over time, sketches the evolutions in the field of public drug expenditures. There was no significant change in the Belgian drug policy that could explain the rising expenditures for the pillars enforcement and treatment (to a limited extent). There is no need to automatically link a change in drug budget to a change in policy. A closer study of general trends in the public expenditures can reveal different kind of explanations. The treatment expenditures in Drugs in Figures III are raised because the treatment of all patients has become more expensive in hospitals, namely the hospital costs per day spent in hospital rose substantially over the four years between the two studies. In contrast, the growth in enforcement spending is caused by a deliberate policy option to increase enforcement activity with regard to the possession and import/export of illegal drugs.

As for the third potential role of public expenditure studies, a cross-country comparison should make it possible to view the different options in drug policy and to explore correlations between different drug policies and public expenditures. If not, the cross-country comparison can only be of limited value for decision makers. From the results section it has become clear that it is very difficult to draw conclusions on a cross-country level because the question always remains if variations in expenditures can be attributed to methodological differences. We illustrated that indeed small changes in proration technique can easily generate other results, and this makes public expenditure studies fragile (Vander Laenen et al., 2008). From this point of view, a cross-country comparison should be avoided until there is a uniform methodology to estimate the public expenditures in different countries. In this respect, the initiative of the EMCDDA to develop a common EU-wide methodology for public expenditure studies warrants applause (EMCDDA, 2008). However, even if an identical methodology is used, (historical) differences in social security systems and institutional factors will still make it difficult to compare public expenditure study results across countries. For example, the reality of private investments in drug policy complicates comparisons across place and space. If one country has a tradition of larger private involvement/donations while another leaves most of its investment to government, a cross-country comparison becomes hazardous. Such differences can be the accidental consequences of differences not directly related to drug policy. For example, in countries with large private and parochial school systems, government expenditures on school-based prevention may be substantially less than societal investments in school-based prevention programmes. Indeed, a public expenditure study is limited to the estimation of public expenditures on drug policy actions; neither private expenditures nor external expenditures are included. Therefore only a social cost study can provide the total social cost of drugs in a given society. Alternately, one could define a new type of

study, one that tracked public and private proactive *expenditures* but which did not include the other social costs (e.g., reactive spending, monetized value of morbidity and mortality, etc.).

In conclusion, a public expenditure study can play an important role on two levels: a comparison across sectors and over time. The public expenditure study can be an instrument for guiding the drug policy toward a balanced resource allocation. Moreover, the public expenditure studies can fulfil an important role by serving as the first step for economic evaluation of drug policy interventions, where a cost analysis and social cost study are the next steps. The ultimate goal of public expenditure studies is to derive important information for policy makers and to improve policy making. However, caution must be applied when using the results of a public expenditure study alone for policy (decision making) purposes.

Firstly, a full policy evaluation can only be completed by combining information about public expenditures with a range of other types of information/studies. This means basing it upon epidemiological data about new trends in drug use and groups of (problem) drug users, on data about reached target groups (in prevention, early intervention and treatment) and on evaluation and effectiveness studies. A public expenditure study identifies facts that are worth looking into more deeply, but only further research can detect for example a lack of performance. Ideally, this leads to an evidence-based policy, where the financial resources are assigned to the implementation and evaluation of evidence-based prevention, regulatory, treatment, and harm-reduction interventions (Wood et al., 2010).

Secondly, through a public expenditure study the resource allocation to and balance in the various drugs and implementation sectors became clear. The EU Strategy 2005-2012, states that “*The present integrated, multidisciplinary and balanced approach of combining demand and supply reduction will remain the basis of the Union’s approach to the drugs problem in the future*” (Council of the EU, 2004, p. 5). It is not clear how demand and supply reduction will be ‘combined’ to reach this balance. In general, what is an ‘appropriate’ or desired balance in resource allocation will depend on the criteria deemed to be essential in (drug) policy decision making. For example, it could mean that the resources need to be allocated in accordance with the relative burden that a type of drugs imposes on society. To others, it means allocating the public expenditures to cost-effectiveness programmes (McDonald, 2011). There are thus multiple meanings of the word balanced, and it is interpreted differently by academics and politicians. The drug budget is most of the time allocated from the departments of law enforcement and health (Ritter, 2010). The public expenditure studies show that policymakers choose for law enforcement, although research indicates that the cost-effectiveness of treatment and harm

reduction is substantially higher than in the criminal justice sector (Boyum & Reuter, 2005). De Beck et al. (2009) confirm that governments are still investing in drug policies and practices that are not supported in the scientific literature, and even conflict with evidence-based results (Reuter, 2001; MacCoun & Reuter, 2008). Politicians follow the historical allocation and want to comply with the prevailing standards. Academics on the other hand, embrace cost effectiveness as an important principle for drug policy. Although a tension exists between the scientific and political worlds, both parties have one thing in common: they want to reduce drug-related harm. This brings us back to the importance of a social cost study. Based on a social cost study, the drug budgets could be contrasted with the (health) impacts of the various classes of drugs, which would allow for reallocation of drug budgets (Mc Donald, 2011). For example, an Australian study indicated that the social cost for tobacco is three times higher than for illegal drugs (Collins & Lapsley, 2008). The international overview of Single et al. (2003) indicated that the government drug budget on average represented only 5 % of the social costs of drug use.

In this paper different manners are explained where the public expenditure study could play an important role for drug policy. Public expenditure studies can provide a valuable basis for an assessment about the public spending on drug policy and they can contribute to a more objective discussion (Mostardt et al., 2010). These kinds of studies can be applied to other criminological policy domains (Van Malderen et al., 2009). The demand for estimations of governmental costs in response to crime is likely to increase in the future (Bowles, 2009). The credit crisis of 2008 puts pressure on the criminal justice budgets and this may enhance the interest in public expenditure studies and economic analysis in general. After all, good supervision on the level of public spending will decrease at least the financial burden of crime on society.

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6. ENDNOTES

¹ A study on national public expenditures would estimate local, state and federal spending.

² At the time of the study, data from the justice department and hospitalisation was only available for the year 2008.

³ In 2004, the Belgian research “Drug policy in Figures, A study into the actors involved, public expenditure and target groups reached” (Drugs in Figures I) has been published (De Ruyver et al., 2004). In 2007 a new estimation of public expenditures on illegal drugs has been carried out: Drugs in figures II (De Ruyver et al. 2007). The methodology in the present study ‘Drugs in figures III’ is refined and extended to carry out a new estimation of public expenditures (anno 2008) on illegal drugs and a first estimation for legal drugs (tobacco, alcohol and psychoactive medication).

⁴ Such as the expenditure of drug users and expenditure of charity funds. Other examples include drug testing and EAP programmes paid for by private employers and, in countries such as the United States that have large private health insurance markets, drug and alcohol treatment and smoking cessation paid for by private health insurance.

⁵ The expenditures for a policy with regard to potential misuse and dependence of alcohol and psychoactive medication.

⁶ The proportion of drugs is taken into account for a repartition key and therefore the quantity of ‘drugs’ is divided by the total amount. For an unit expenditure less data are required because only the quantity ‘drugs’ (for example, number of hospitalisation days drugs) is necessary to estimate the drug related public expenditure.

⁷ European School Survey Project on Alcohol and Other Drugs (ESPAD) is a collaborative effort of research teams in more than forty European countries, the overall aim is to repeatedly collect comparable data on substance use in Europe among 15–16 year old students

The Pompidou Group is an inter-governmental body formed within the Council of Europe, their mission is to contribute to the development of multidisciplinary, innovative, effective and evidence-based drug policies in the Member States.

⁸ A great deal of the expenditures are measured with unit expenditure or proration technique and this must be regarded as approximations as they are built mainly on various assumptions. Therefore intervals are presented: a low end estimate and a high-end estimate augment the baseline or best point estimates (which is the average between low and high estimate).

⁹ The expenditures are not presented separate for each type of drugs, because the sector of alcohol is entangled with illegal drugs. For instance, treatment activities focus on both type of drugs and this makes it impossible to measure the exact amount of expenditures for alcohol or illegal drugs.

¹⁰ Minimum 557 million of the treatment expenditures is specifically labeled for alcohol treatment (for example treatment of alcohol abuse in hospitals, the project ‘alcohol and pregnancy’,...).

¹¹ There is a probably an overestimation of illegal drug expenditures for the sector prevention and treatment, because a large amount of the expenditures is used for interventions that do not distinguish between alcohol en illicit drugs.

¹² The federal drug policy note resulted in a Joint Declaration of the Inter-ministerial Conference on Drugs in January 2010.

¹³ No category harm reduction for tobacco is included, because no public expenditures are identified in this domain for the year 2008 (Vander Laenen et al. 2011).

¹⁴ Since September 2009, the reimbursement of tobacco dependence is extended to each patient that wants to quit smoking. Consequently, the public expenditure for tobacco will raise in the year 2010 with 3.4 million Euros.

¹⁵ The expenditures mentioned in the 2004 study are expressed in terms of their real value in 2008. Inflation is taken in account (general index= 111.32 base 2004, year 2008)

¹⁶ In the Drugs in Figures III study, the Flemish expenditure for syringe exchange programmes are no longer listed as prevention; it is considered as the minimum amount for harm reduction.

¹⁷ Inflation is taken in account (general index= 111.32 base 2004, year 2008)

¹⁸ The methodology of Drugs in Figures II could not be used for the penitentiary, because the necessary information for the proration technique was not available. The minimal estimation of Drugs in Figures III is therefore taken into account.

¹⁹ The proportion of new mandates 'drugs' in houses of Justice increased from 13.12% to 17.20%.

The population in the penitentiary for a drug offence increased with 9,78% (minimum estimate) and with 15.45% in the case of drug offences in combination with other offences(maximum estimate).

²⁰ The dependence rates of drug use did not change in Belgium during the period 2004-2008 (Lamkaddem & Roelands, 2010).

²¹ A comparison with US studies is not possible, because the studies are limited to federal expenditures (ONDCP, 1989-2011) or because the expenditures for illegal drugs could not be extracted from the total expenditures for substance use (CASA, 2009).

²² If the public expenditure per capita or the proportion of GDP is not mentioned in the study, then authors' calculations are made with the statistics (population or GDP of the country) of OECD (Organisation for Economic Co-operation and Development). Retrieved October 10, 2011, from OECD.StatExtracts: http://stats.oecd.org/Index.aspx?DataSetCode=SOCX_AGG.

²³ Original expenditures: 2,185 million Euros. Expenditures for drug related crime (462 million Euros) and treatment of people with infectious diseases arising from drug use (2.8 million Euros) are subtracted (appendix).

²⁴ Original expenditures: 737 million Euros. Expenditures for drug related crime (235 million Euros) are subtracted (appendix).

²⁵ The proactive government expenditures of Australia are taken into account. The amount of 1,875 million \$ reactive expenditures is excluded.

²⁶ An update of the study Origer (2002) is conducted for the year 2009. Information available in the 2010 national drug report "Grand Duchy of Luxembourg" from Origer (2010).

²⁷ The original expenditures were 23 million Euros. Expenditures for HIV/AIDS treatment provided to patients infected via intravenous drug use (1.3 million Euros) are subtracted.

²⁸ The cost for HIV/AIDS treatment provided to patients infected via intravenous drug use cannot be subtracted, because the precise amount is not reported. The total expenditure of 38 million Euros is consequently an overestimation.

²⁹ The expenditures for drug-related crimes are excluded for the cross-country comparison with Belgium. The original division of the drug policy expenditures in the Swedish study is 24 % treatment, 75 % enforcement, 1 % prevention and 0.1 % harm reduction (Ramstedt, 2006).

³⁰ Germany, France and Luxembourg are excluded from this comparison because they used other classification systems. Proportions for the Netherlands and Sweden were calculated without the reactive expenditures.

³¹ Original division: 13 % treatment, 75 % enforcement, 2 % prevention and 10 % harm reduction (Rigter, 2006).

³² In the study of Moore (2008) is 1% of governments' education expenditures marked as illicit drug prevention.

³³ The total direct addiction treatment costs in general health care were calculated by taking one-third of the expenditures of addiction care centers into account (Rigter, 2006). The Belgian study multiplied the daily cost with the days spent in a hospital for a drug-related diagnosis (Vander Laenen et al., 2011).

³⁴ In 2007, the total public social expenditure as a percentage of GDP is 20.1% for the Netherlands and 27.3% for Sweden. Retrieved October 10, 2011, from OECD: http://stats.oecd.org/Index.aspx?DataSetCode=SOCX_AGG.

³⁵ Minimum 557 million of the treatment expenditures is specifically labeled for alcohol treatment (for example treatment of alcohol abuse in hospitals, the project 'alcohol and pregnancy',...).

STUDY 2

PUBLIC SPENDING FOR ILLEGAL DRUG AND ALCOHOL TREATMENT IN HOSPITALS:
AN EU CROSS-COUNTRY COMPARISON²

ABSTRACT

Background: In view of the current economic crisis and the resulting austerity measures being implemented by governments across Europe, public expenditure for substance abuse treatment has increasingly become a subject of discussion. An EU cross-country comparison would allow an estimation of the total amount of public resources spent on substance abuse treatment, compare various substance abuse treatment funding options, and evaluate the division of expenditures between alcohol and illegal drugs. The purpose of this study is to estimate the public spending of EU countries for alcohol and illegal drug abuse treatment in hospitals.

Methods: Our study uses a uniform methodology in order to enable valid cross-national comparisons. Our data are drawn from the Eurostat database, which provides anno 2010 data on government spending for the treatment of illegal drug and alcohol abuse in 21 EU member states. The cross-country comparison is restricted to hospitals, since data were unavailable for other types of treatment providers. The systematic registration of in- and outpatient data is essential to monitoring public expenditures on substance abuse treatment using international databases.

Results: Total public spending for hospital-based treatment of illegal drug and alcohol abuse in the 21 EU member states studied is estimated to be 7.6 billion euros. Per capita expenditures for treatment of illegal drug abuse vary, ranging from 0.1 euros in Romania to 13 euros in Sweden. For alcohol abuse, that figure varied from 0.9 euros in Bulgaria to 24 euros in Austria. These results confirm other studies indicating that public expenditures for alcohol treatment exceed that for illegal drug treatment.

Conclusions: Multiple factors may influence the number of hospital days for alcohol or illegal substance abuse treatment, and expenditures fluctuate accordingly. In this respect, we found a strong correlation between gross domestic product (GDP) per capita and public expenditures per hospital day. The prevalence of problematic (illegal or legal) drug use in a country did not correlate significantly with the number of hospital days. Other factors must be included in the analysis of public

² A version of this paper has been published as Lievens, D., Vander Laenen, F. & Christiaens, J. (2014). Public spending for illegal drug and alcohol treatment in hospitals: an EU cross-country comparison. *Substance Abuse Treatment, Prevention, and Policy*, 9, 26.

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expenditures for the treatment of substance abuse, such as the drug policy in a given country and the social norms regarding alcohol consumption.

Key words: drugs, alcohol, substance abuse, public health, hospital-based treatment, Europe, public expenditure

1. INTRODUCTION

Illegal drugs and especially alcohol have a significant health impact on human life in Europe. The burden of diseases resulting from alcohol and illegal drugs is enormous; together they account for 11% of disability adjusted life years (DALY's¹) lost in Europe (Rehm, Taylor & Room, 2006). The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) indicated that at least 1.2 million individuals received some kind of treatment for illegal drug use in the EU and its candidate countries (EMCDDA, 2013a). In addition, Rehm, Shield, Rehm, Gmel & Frick (2012) estimated that approximately 1.1 million people with an alcohol use disorder in the EU are in treatment². A considerable share of substance abuse treatment is provided in hospitals. EU countries reported more than 161,000 hospital discharges for mental and behavioral disorders due to illegal drug use, and another 707,000 due to alcohol use in 2010 (Eurostat, 2013a). From the sheer number of people in treatment, it is clear that substance abuse treatment has an economic impact.

Rising health care costs have increased pressure on providers, insurers, and policymakers to monitor the costs of all health care services (Bray & Zarkin, 2006). Moreover, public expenditures for substance abuse treatment are increasingly a subject of discussion in view of the economic crisis and of austerity. The cuts in government spending across Europe may affect substance abuse treatment; therefore, it is crucial that policymakers understand the economic value of substance abuse treatment services (EMCDDA, 2011; Collins et al., 2010). This economic evaluation of substance abuse treatment is gaining momentum (Bray & Zarkin, 2006), and the EU drugs strategy (2013-2020) supports this evolution by stating that actions must be evidence-based and cost-effective (Council of the European Union, 2012). This puts a new premium on measuring and valuing the 'return on investment' of government expenditures for drug and alcohol abuse interventions (Maynard, 2004). This type of evaluation method is clearly linked to public expenditure studies, because it cannot be completed without the estimation of public spending on substance abuse treatment. Some aspects of drug and alcohol policy can be studied within a single country; for example, secondary school classrooms can be randomly assigned to receive one prevention curriculum or another, with effects on self-reported substance use assessed at follow-up. However, many important dimensions of policy operate at the national level, making cross-national comparisons of both policies and problem severity important.

Unfortunately, making valid cross-national comparisons can be surprisingly difficult because of differences in definitions, data, and organizational structures across countries. Creating a foundation for cross-national comparisons has been a multi-decade endeavor undertaken by many researchers, notably those at the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA, 2008). This

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study contributes to that effort by estimating public expenditures on hospital-based treatment in a consistent manner for 21 EU member states.

The current study is unique in that few cross-national comparisons of substance abuse treatment costs have been conducted. A previous attempt to calculate the total European cost of illegal drug treatment services (published in a EMCDDA selected issue in 2011), suffered from limited data (EMCDDA, 2011). Rehm et al. (2012) estimated the social cost to the EU countries for the treatment and prevention of harmful alcohol use and alcohol dependence to be 6.3 billion euros (2010). However, they did not report on the cost for specific types of services such as outpatient treatment and inpatient treatment. As a result, the cost for hospital treatment is unknown. Neither is it possible to prorate the estimate of Rehm et al. (2012) since the cost per episode of treatment tends to be higher in inpatient settings (EMCDDA, 2011). Our study aims to remedy this by estimating hospital-based treatment expenditures.

The study is conducted within the framework of policy evaluation and therefore focuses on public spending. Public expenditures are the direct instrument of public policy and they dominate in the financing of substance abuse treatment. Within the EU, health care is mainly financed by governmental funding because the public resources in the health care system are supported through general taxation and/or insurance-based systems (Pestieau, 2006).

Total public expenditures related to illegal drugs and alcohol (including but not limited to substance abuse treatment) have been estimated in social cost studies and public expenditure studies. Such studies have been conducted in Australia, the United States, Canada and some EU countries such as Belgium, Luxembourg, the Netherlands and Sweden (CASA, 2001, 2009; Garcia-Altés et al., 2002; Origer, 2002; Fenoglio, Parel & Kopp, 2003; De Ruyver, Casselman & Pelc, 2004; Rigter, 2006; Ramstedt, 2006; Kopp & Fenoglio, 2006; De Ruyver et al., 2007; Moore, 2008; Mostardt et al., 2010; Vander Laenen et al., 2011). While many of these studies follow a common set of general principles, they differ in particulars and so cannot support cross-national comparisons.

Some cross-country studies of costs or public expenditures in the field of alcohol and/or illegal drugs have been conducted in Europe, including for treatment spending (Kopp & Fenoglio, 2003; Postma, 2004; Andlin-Sobocki & Rehm, 2005; Anderson & Baumberg, 2006; EMCDDA, 2011; Gustavsson et al. 2011; Lievens et al., 2012;). However, while each of these studies are valuable, they suffer from one or more methodological problems. Kopp & Fenoglio (2003) and the EMCDDA (2011) were confronted with incomplete or imprecise data provided by the EU member states. Other studies merely compiled

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data from different national studies and so were confronted with data of varying quality (Andlin-Sobocki & Rehm, 2005; Anderson & Baumberg, 2006; Gustavsson et al., 2011). Lievens et al. (2012) even concluded that a truly valid cross-country comparison may be infeasible because of the conceptual and methodological differences in the national public expenditure studies.

Nevertheless, having an EU cross-country comparison of the public expenditures for substance abuse treatment would be valuable for several reasons (Ritter, 2007; EMCDDA, 2008; Lievens et al., 2012). It would allow one to estimate the total amount of public resources spent on substance use treatment. Moreover, it would allow comparison of substance abuse treatment funding in different countries. Country profiles providing information on treatment organization and its budgetary impact could be compiled and used as a first step in a full economic evaluation to find the most cost-effective way of organizing substance abuse treatment (Maynard, 2004). Finally, an EU cross-country comparison would enable examination of the division of expenditures between alcohol and illegal drugs, allowing for recommendations on resource allocations (McDonald, 2011).

The remainder of this paper is organized as follows: first, public expenditures (including social security funds) for illegal drug and alcohol treatment in hospitals are presented and compared across EU countries. This will provide insight into the dynamics of substance abuse treatment organization across countries. Second, an estimate of the total EU spending on hospital substance abuse treatment is given. The public expenditures for illegal drug treatment are compared to expenditures for alcohol treatment. Finally, we discuss the factors that may influence the number of hospital days and the expenditures that come with it.

2. METHODS

Particular care was taken to ensure a uniform methodology across the EU member states studied in order to allow a valid cross-national comparison. Databases of international organizations were analysed to identify health care expenditures for alcohol and illegal drug treatment³. The online databases of the following organizations were consulted: Organization for Economic Co-operation and Development (OECD); the European Commission; the World Health Organization (WHO); the United Nations (UN); European Monitoring Centre for Drugs and Drug Addiction (EMCDDA); European Medicines Agency (EMA); and European Centre for Disease Prevention and Control (ECDC). One would expect that these databases provide data on expenditures for various types of substance abuse treatment services. In the United States, both inpatient and outpatient cost of service groups include costs associated with mental health diagnosis, labs, and surgery services covered by Medicaid (Collins,

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Cooper, Horn, Stohr, Walsh, Bostaph et al., 2010). However, an analysis of the EU databases makes clear that Eurostat is the only database that provides consistent and comparable data for treatment provided in hospitals. Information for other types of treatment providers, such as nursing and specialised residential care facilities and providers of ambulatory health care are not consistently available. In view of this limitation, the current study focuses on hospital treatment.

The Eurostat database is used to measure public spending on illegal drug and alcohol treatment in hospitals. This database provides financial data (public health budgets for each type of treatment provider) with the System of Health Accounts⁴ and data on hospital activities (hospital days by diagnosis).

The financial data are collected by the System of Health Accounts (published by Eurostat, OECD and WHO), which systematically describes the financial flows related to health care (OECD, Eurostat & WHO, 2011). For most EU countries, the public health budgets for each type of treatment provider are published on the Eurostat website (Eurostat, 2013b), although there were no data available for six EU member states (Greece, Estonia, Ireland, Italy, Malta and the United Kingdom). In the System of Health Accounts, public health expenditures are identified as those labeled 'the general government', which includes the central, state and local government and social insurance funds. Hospital expenditures include the expenditures for general hospitals, for mental health and substance abuse hospitals, and for other specialty hospitals⁵ (e.g. hospitals for infectious diseases, rehabilitative and preventive services).

Eurostat also publishes hospital activities by diagnosis (Eurostat, 2013c) for each country; aggregated data are provided for total hospital discharges and total hospital days. In theory, these hospital statistics cover the activities for general, mental health and specialty hospitals (E. Cayotte, personal communication, August 19, 2013), although six countries are not able to report the hospital days for all hospital types. Consultation of the Eurostat and WHO country metadata indicates that data are missing for Belgium, Denmark, France, Luxembourg, the Netherlands and Spain. Therefore, the results for the latter countries will be presented separately.

Based on the data in the Eurostat database, government spending on illegal drug and alcohol treatment in hospitals was identified using the following formula:

$$\text{average cost per hospital day} \times \text{hospital days for treating illegal drug or alcohol disorders}$$

This method has some limitations. The first limitation is that the average cost per hospital day is calculated by dividing the public health expenditure of hospitals by the total hospital days for treating

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all causes of diseases. This methodology assumes that all diagnoses have the same unit cost of treatment, despite the common-sense notion that the cost per hospital day varies across diagnosis. Furthermore, the hospital expenditures figure used to calculate the average cost per hospital day includes inpatient, emergency and outpatient services. The Eurostat database makes no distinction between types of treatment service. Consequently, the expenditures for outpatient and emergency services are attributed to inpatient activities and this leads to an overestimation of the average cost per hospital day. The second limitation is that the formula is based on the number of hospital days, but 'hospital nights' might be a more suitable term since hospital days are delineated as days in which a person admitted as an inpatient stays overnight in a hospital (Eurostat, 2013d). Thus, the measure excludes outpatient treatment and treatment of patients who were not admitted (e.g. those treated in the emergency room without admission). Nevertheless, economic cost studies frequently use hospital days to estimate the hospitals costs for treating substance abuse (Rice, Kelman & Miller, 1991; Fox, Merrill, Chang & Califano, 1995; Single et al., 1998; Rice, 1999; De Ruyver et al., 2004, 2007; Jacobs et al., 2008; Vander Laenen et al., 2011). Hospital days are used as a measure because it is assumed to capture the prevalence of recorded substance abuse and they take into account the time spent for treatment. In the Eurostat database, hospital days with the primary diagnosis of mental and behavioral disorders due to psychoactive substance use or alcohol use (ICD10 codes⁶ F10-F19) are included. In the case of multiple diagnoses, the most severe and resource-intensive of these diagnoses is recorded as the primary diagnosis. Consequently, the public spending for substance abuse is underestimated because the patients with a non-substance-abuse-related primary diagnosis and a substance abuse disorder as secondary diagnosis are not taken into account. An overestimation is also possible for patients with a primary diagnosis of substance abuse and a secondary diagnosis (e.g. liver disease) that caused an extended stay in the hospital.

This cross-country comparison is conducted for 21 of the 27 EU member states⁷ with data anno 2010. The public expenditures for illegal drug and alcohol treatment in hospitals are reported per capita, as a share of *gross domestic product* (GDP) and total. In order to explain these results, the individual components of the formula (public expenditure per hospital day, hospital days for illegal drug or alcohol treatment, and the proportion of hospital days attributable to drug treatment) and prevalence rates are presented. Additionally, the total amount of public spending for the EU for illegal drug and alcohol treatment in hospitals is estimated. This estimation is restricted to 21 EU member states. An extrapolation to the EU-27⁸ is not possible given the lack of data on health expenditures⁹ for six EU member states (Greece, Estonia, Ireland, Italy, Malta and the United Kingdom).

3. RESULTS

3.1. Public spending for illegal drug treatment in hospitals

Numeric results

Public expenditures for hospital treatment are presented in two tables. Table 1 presents the countries that register the illegal drug treatment hospitals days and expenditures for all types of hospitals (general, mental health and specialty hospitals). The countries in table 2 only provide data for general (2 countries) and specialty (4 countries) hospitals.

Table 1: Hospital days and expenditures for illegal drug treatment (general, mental health and specialty hospitals), for 15 EU countries, 2010

Country *	Public expenditure per hospital day (euros)	Hospital days for illegal drug treatment per 1,000 capita	Proportion of hospital days attributable to illegal drug treatment (%)	Illegal drug treatment expenditure by hospitals (million euros)	Illegal drug treatment expenditure by hospitals, per capita (euros)	Illegal drug treatment expenditure by hospitals, as percentage of GDP
Sweden	1532	9	0.88%	123	13.2	0.035%
Austria [†]	507	15	0.62%	65	7.8	0.023%
Germany	391	16	0.72%	523	6.4	0.021%
Slovenia	432	7	0.59%	6	3.2	0.018%
Finland [†]	428	6	0.28%	14	2.5	0.008%
Slovakia	165	11	0.75%	9	1.7	0.014%
Poland	167	9	0.70%	55	1.4	0.015%
Czech Republic	211	17	0.79%	37	3.5	0.025%
Portugal	1045	0.6 [‡]	0.11%	6	0.6	0.004%
Hungary	121	5	0.28%	6	0.6	0.006%
Latvia [†]	140	3	0.24%	0.8	0.4	0.005%
Bulgaria	69	3	0.19%	2	0.2	0.004%
Lithuania	113	1	0.06%	0.4	0.1	0.001%
Romania	81	1	0.07%	2	0.1	0.002%
Cyprus [†]	936	0.01 [‡]	0.002%	0.006	0.01	0.00003%
Mean¹⁰ (SD)	423 (429)	7 (6)	0.42% (0.31%)	57 (133)	2.8 (3.7)	0.012% (0.01%)

* The European countries are not classified in regions, because no global classification system is available for illegal drugs (contrary to studies on alcohol, which distinguish geographical areas by drinking traditions and patterns; WHO, 2013). Drug-related research (e.g., Montanari et al., 2013; Barrio et al., 2013) uses different types of classification according to the investigated type of drugs. Nevertheless, the conclusions for multiple countries are described by the UN geographical regions: Eastern Europe, Northern Europe, Southern Europe and Western Europe.

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[†]Contrary to the other countries, the live-born infants (Z38) of Austria, Cyprus, Latvia and Finland are not included in the total hospital days, and this could lead to an overestimation of the hospital expenditures.

[‡]The data for Cyprus cover only public sector hospitals. Portugal covers all public inpatient institutions and only two private hospitals. Consequently, the hospital days for illegal drug treatment are underestimated, and this may affect the proportion of hospital days attributable to illegal drug treatment. Therefore, the hospital days and public expenditures for illegal drug treatment in Cyprus and Portugal will not be further analysed.

Table 1 shows that on average the hospital expenditure for illegal drug treatment in the EU-15 is 2.8 euros per capita and 0.01% of GDP. Table 1 also shows important differences between EU countries. Sweden invests the most in hospital-based illegal drug treatment (per capita 13 euros and 0.035% of GDP), primarily because its costs per hospital day appear to be extremely high. Austria (per capita 8 euros and 0.023% of GDP) and Germany (per capita 6 euros and 0.021% of GDP) complete the top three, combining fairly high hospital expenditures (per capita)¹¹ with high rates of hospital-based treatment for illegal drugs. A number of Northern and Eastern European countries (Bulgaria, Hungary, Romania, Lithuania and Latvia) reported hospital expenditures lower than 1 euro per capita and 0.01% of GDP. The cost per hospital day of these countries is less than one-third of the average in Sweden, Austria, and Germany, and this is combined with rates of hospital-based treatment per capita that are less than one-sixth in size.

Interpretation

The hospital expenditures for illegal drug treatment are calculated on the basis of public health expenditures and hospital days.

First, the average public expenditure per hospital day across the 15 EU countries is 423 euros per day. Countries in Western and Southern Europe (except Germany) spend more than this average, with Sweden reporting the highest expenditure (1532 euros). Countries in Eastern Europe reported much less public funding in hospitals. The lower expenditures of Eastern European countries are mainly due to the lower economic power in terms of GDP (Shield et al., 2012) and the lower proportion of public financing of health expenditures (Chawla, 2007).

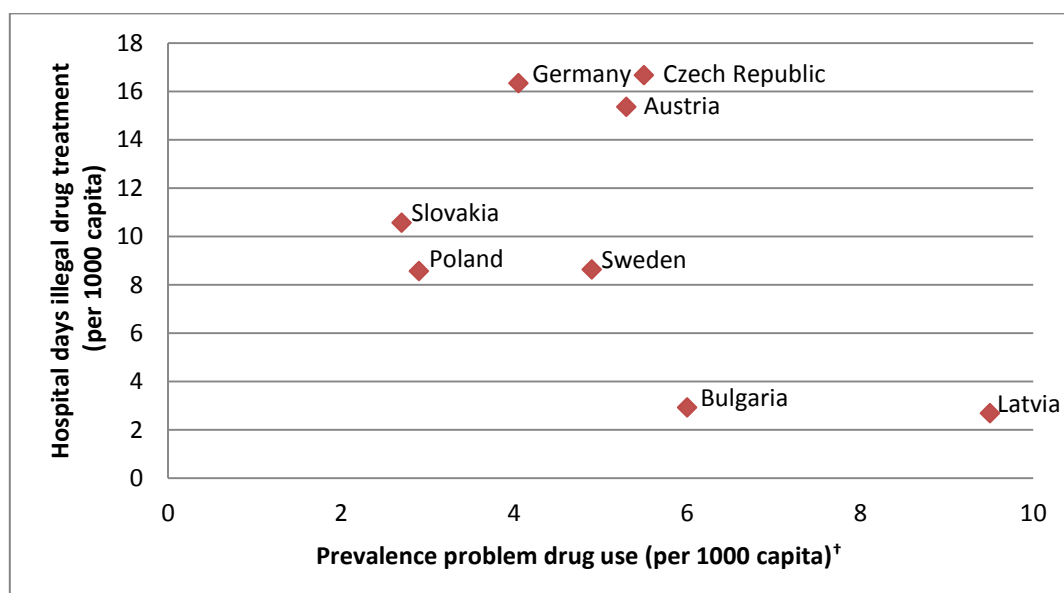
Second, the number of hospital days for illegal drug treatment per 1,000 capita range from 1 to 17 days. Austria (15), Germany (16) and the Czech Republic (17) registered the highest number of hospital days, whereas Lithuania (1) and Romania (1) registered the least number of hospital days. When comparing hospitals days for illegal drug treatment to the total number of hospital days, Sweden (0.88%), Slovakia (0.75%), Germany (0.72%) and the Czech Republic (0.79%) have the largest proportion of hospital days for illegal drug treatment. This may indicate that the latter countries

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organize drug treatment mainly inside hospitals and/or that they are confronted with a high number of problem drug users.

To discover whether differences in the prevalence of problem drug users can explain the observed (differences in) hospital days, figure 1¹² plots the number of hospital days used for drug treatment versus the number of problem illegal drug users (12 months prevalence), both expressed in per capita terms using data from the statistical bulletin of the EMCDDA (2013).

Figure 1: Prevalence of problem drug use (2007-2011^{*}) versus hospital days for 8 EU countries



^{*} The prevalence for problem drug users aged 15-64. Depending on the availability of data, prevalence estimates are presented for the years 2007, 08, 09, 10 or 11.

[†] The EMCDDA did not provide prevalence rates for Slovenia, Finland, Portugal, Hungary, Lithuania and Romania.

Pearson's correlation coefficient was used to analyse the linear association between hospital days and the prevalence of problem drug use, however no positive correlation is observed ($r = -0.468$, $p = 0.243$). This implies that the high number of hospital days in Sweden, Slovakia, Austria and Germany cannot be explained by these country's prevalence rates of problem drug use. However, figure 1 gives an indication of how drug treatment is organized in the 8 EU member states. On the one hand, Germany, Austria, Slovakia, Poland and the Czech Republic have a high number of hospital days in comparison with the prevalence of problem drug use. In these countries, problem drug users treated in a hospital stayed three-to-four days on average. On the other hand, Latvia and Bulgaria report less than one hospital day per problem drug user despite their having a high prevalence of problem drug use. It

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seems that most problem drug use treatment in these countries is organized outside hospitals. An alternative explanation could be that these countries provide less treatment altogether.

As discussed above, France and Denmark only provide data for general hospitals. Belgium, Luxembourg, the Netherlands and Spain have information for specialty hospitals and general hospitals, but not for mental health hospitals. Therefore, the expenditure estimates for the countries in table 2 are obviously underestimated. Nonetheless, table 2 shows that on average the hospital expenditure for illegal drug treatment in the EU-4 is 9.6 euros per capita and 0.015% of GDP. Luxembourg has the highest share of hospital days (2.50%) and of expenditures (34 euros per capita) attributable to illegal drugs in the EU. This could be explained by its relatively high public expenditures for hospital care and prevalence of problem drug use (6.2 per 1.000 capita) (EMCDDA, 2013b).

**Table 2: Hospital days and expenditures for illegal drug treatment (general and specialty hospitals),
for 6 EU countries, 2010**

Country	Public expenditure per hospital day (euros)	Hospital days for illegal drugs per 1,000 capita	Proportion of hospital days attributable to illegal drug treatment (%)	Illegal drug treatment expenditure by hospitals (million euros)	Illegal drug treatment expenditure by hospitals, per capita (euros)	Illegal drug treatment expenditure by hospitals, as percentage of GDP
General hospitals						
France	1036	0.4	0.04%	29	0.4	0.001%
Denmark*	2125	0.2	0.02%	2	0.4	0.001%
Mean (SD)	1580 (770)	0.3 (0.2)	0.03% (0.02%)	15 (19)	0.4 (0.06)	0.001% (0.0004%)
General and Specialty hospitals (no mental health or substance abuse hospitals)						
Luxembourg [†]	1079	32	2.50%	17	34	0.044%
Spain [†]	1131	2	0.27%	97	2.1	0.009%
Belgium	579	2	0.16%	12	1.1	0.003%
Netherlands	1620	0.5 ^d	0.07%	12	0.7	0.002%
Mean (SD)	1102 (426)	9 (15)	0.75% (1.17%)	35 (42)	9.6 (16.6)	0.015% (0.02%)

* Denmark and Belgium have only data with hospitals days available for 2009.

[†] Contrary to the other countries, the live-born infants (Z38) of Luxembourg and Spain are not included in the total hospital days, and this could lead to an overestimation of the hospital expenditures.

3.2. Public spending for alcohol treatment in hospitals

Numeric results

Results for public expenditures for alcohol treatment in hospitals are also presented in two separate tables (table 3 and table 4) depending on whether data were available for the different types of hospitals. The countries are divided into four geographical areas based on the WHO classification concerning drinking traditions and patterns (WHO, 2013). However, it is difficult to draw conclusions on a regional level due to missing data for 12 EU member states (Belgium, Denmark, Estonia, France, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Spain and the United Kingdom).

**Table 3: Hospital days and expenditures for alcohol treatment (general, mental health and specialty hospitals),
for 15 EU countries, 2010**

Country	Public expenditure per hospital day (euros)	Hospital days for alcohol treatment per 1,000 capita	Proportion of hospital days attributable to alcohol treatment (%)	Alcohol treatment expenditure by hospitals (million euros)	Alcohol treatment expenditure by hospitals, per capita (euros)	Alcohol treatment expenditure by hospitals, as percentage of GDP
Central-western and western country group (Belgium, France, Ireland, Luxembourg, Netherlands and UK missing)						
Austria*	507	47	1.88%	198	23.7	0.069%
Germany	391	49	2.16%	1578	19.3	0.063%
Mean (SD) Central-western and western country group	449 (82)	48 (2)	2.02% (0.2%)	888 (976)	21.5 (3.1)	0.066% (0.004%)
Central-eastern and eastern country group (Estonia missing)						
Slovenia	432	34	2.69%	30	14.5	0.084%
Slovakia	165	58	4.11%	51	9.5	0.078%
Poland	167	51	4.15%	325	8.5	0.092%
Hungary	121	31	1.76%	38	3.8	0.039%
Latvia*	140	19	1.68%	6	2.7	0.033%
Czech Republic	211	53	2.54%	118	11.3	0.079%
Lithuania	113	19	1.08%	7	2.2	0.026%
Romania	81	13	0.73%	22	1.0	0.018%
Bulgaria	69	13	0.87%	7	0.9	0.019%
Mean (SD) central-eastern and eastern country group	166 (109)	32 (18)	2.18% (1.30%)	67 (103)	6.0 (5.0)	0.052% (0.030%)

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Nordic countries (Denmark missing)						
Sweden	1532	11	1.10%	155	16.6	0.044%
Finland*	428	25	1.19%	57	10.7	0.032%
Mean (SD) nordic countries	980 (780)	18 (10)	1.14% (0.06%)	106 (69)	13.6 (4.1)	0.038% (0.009%)
Southern Europe (Greece, Italy, Malta and Spain missing)						
Portugal	1045	3 [†]	0.49%	29	2.7	0.017%
Cyprus*	936	0.03 [†]	0.01%	0.1	0.1	0.001%
Mean (SD) southern Europe	990 (78)	1.3 (1.8)	0.25% (0.35%)	14 (20)	1.4 (1.8)	0.009% (0.011%)
Mean (SD) EU-15	423 (429)	28 (19)	1.76% (1.21%)	175 (399)	8.5 (7.4)	0.046% (0.029%)

* The live-born infants (Z38) of Austria, Cyprus, Latvia and Finland are not included in the total hospital days, and this could lead to an overestimation of the hospital expenditures.

[†] The data of Cyprus covers only public sector hospitals. Portugal covers all public inpatient institutions and only two private hospitals. Consequently, the hospital days for alcohol treatment are underestimated, and this may also affect the proportion of hospital days attributable to alcohol treatment. The results of Southern Europe will not be analysed due to this missing data.

Table 3 shows that on average the hospital expenditure for alcohol treatment in the EU-15 is 8.5 euros per capita and 0.046% of GDP. We see important differences between EU countries. The Central-Western and Western country group have the highest expenditures in terms of GDP (average of 0.066%) and per capita with 24 euros for Austria and 19 euros for Germany. This contrasts with many members of the Central-Eastern country group that reported an average hospital alcohol treatment spending of 6 euros per capita (0.052% of GDP). The Nordic country group reported spending of 14 euros per capita but the lowest expenditures in terms of GDP (0.038%).

Interpretation

In this section we explain hospital expenditures for alcohol treatment using the financial investment in public health and hospital use.

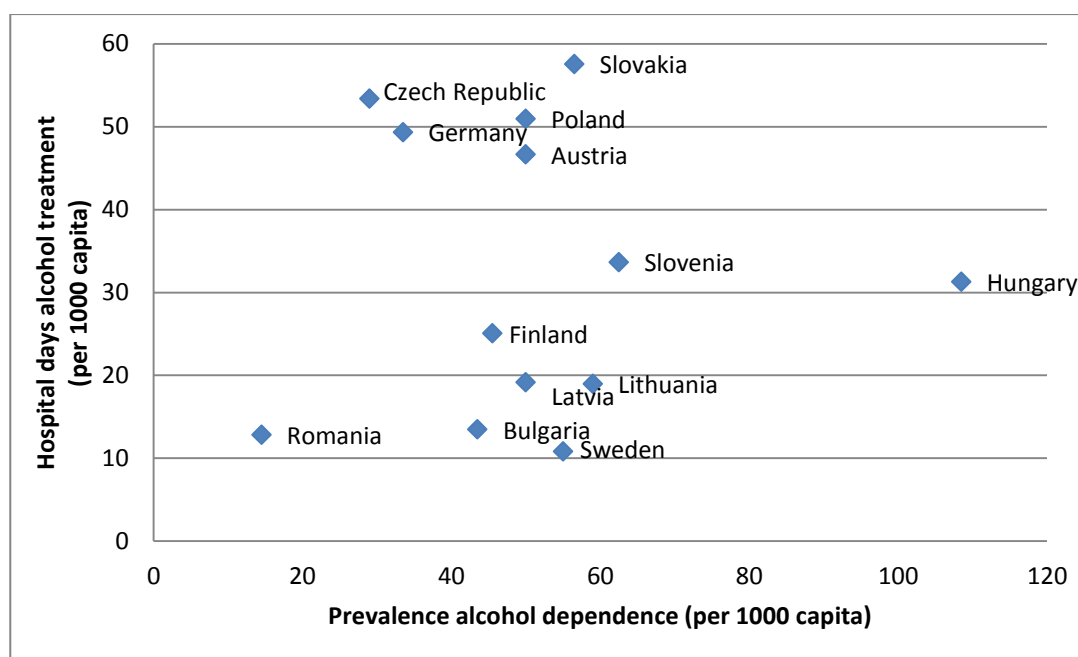
The first conclusion is that the public expenditures per hospital day vary extensively ranging from 69 euros in Bulgaria to 1532 euros in Sweden. The average in Eastern European countries of 166 euros is much lower than the average of the 15 countries studied (423 euros). Consequently, countries with a similar proportion of hospital days attributable to alcohol treatment (e.g. Sweden and Lithuania) could

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have a different outcome in terms of alcohol treatment expenditure per capita. As is the case for expenditures on illegal drug treatment, the lower expenditures of Eastern European countries could be explained by the mix of public and private funding of health care (Chawla, 2007) and differences in terms of GDP (Shield et al., 2012).

The second conclusion is that Slovakia, Poland and the Czech Republic reported the highest number of hospital days for alcohol treatment, with more than 50 hospital days per 1,000 capita, a rate that translates to alcohol treatment accounting for more than 4% of hospital days in Slovakia and Poland. The Central-Western and Western country group reported on average 48 hospital days per capita (2.02% of hospital days for alcohol treatment). In the Nordic countries, the number of hospital days for alcohol treatment is limited to 1.14%. As is the case for illicit drugs, the hospital days are investigated by looking at a country's substance abuse treatment organization and the prevalence rates. Rehm et al. (2012) provide an overview of 12-month prevalence rates for alcohol dependence per European country. In figure 2, these prevalence rates are compared with the hospital days for alcohol.

Figure 2: Prevalence of alcohol dependence (1999-2009^{*}) versus hospital days for 13 EU countries



* The prevalence of men and women aged 18-64. Depending on the availability of data, prevalence estimates are presented for varying years.

As was the case for illegal drugs, no significant Pearson correlation ($r = 0.003$, $p = 0.991$) was found between hospital days and the prevalence of alcohol dependence. The majority of European countries (8) have a prevalence of alcohol dependence between 4% and 6%. An exceptional case is Hungary, which has the highest prevalence rate of alcohol dependence with 10.85%, although the Hungarian number of hospital days for alcohol treatment lies below the average of the 13 countries studied (32.5

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days). It is likely that Hungary, and Sweden and Bulgaria as well, organize alcohol treatment mostly outside of hospitals because for an estimated average of three-to-five persons with alcohol dependence (Rehm et al., 2012) only one hospital day is recorded in these countries. By contrast, Germany, Slovakia, Poland and the Czech Republic reported more than one hospital day of treatment per person with alcohol dependence.

Table 4 provides an overview of the six countries that provided data limited to general (and specialty) hospitals. As was the case for table 2, the expenditures in hospitals in the countries in table 4 are underestimated. Despite the lack of data from mental health hospitals, on average the hospital expenditure for alcohol treatment in the EU-4 is 23 euros per capita and 0.035% of GDP. Luxembourg has the highest hospital expenditure (82 euros per capita and 0.1 % of GDP) for alcohol treatment in the EU, and the share of hospital days (5.94%) attributable to alcohol is high in comparison with the other EU countries (1.81%). At first sight, this could not be explained by the prevalence of people with alcohol dependence (which is relatively low; 3.4%) (Rehm et al., 2012).

**Table 4: Hospital days and expenditures for alcohol treatment (general and specialty hospitals),
for 6 EU countries, 2010**

Country	Public expenditure per hospital day (euros)	Hospital days for alcohol treatment per 1,000 capita	Proportion of hospital days attributable to alcohol treatment (%)	Alcohol treatment expenditure by hospitals (million euros)	Alcohol treatment expenditure by hospitals, per capita (euros)	Alcohol treatment expenditure by hospitals, as percentage of GDP
General hospitals						
Denmark [*]	2125	3	0.40%	39	7.1	0.017%
France	1036	5	0.52%	331	5.1	0.017%
Mean (SD)	1580 (770)	4 (1)	0.46% (0.08%)	185 (206)	6.1 (1.4)	0.017% (0.0003%)
General and Specialty hospitals (no mental health or substance abuse hospitals)						
Luxembourg [†]	1079	76	5.94%	41	81.9	0.105%
Belgium	579	9	0.72%	53	4.9	0.015%
Spain [†]	1131	3	0.38%	143	3.1	0.014%
Netherlands	1620	1	0.19%	34	2.1	0.006%
Mean (SD)	1102(426)	22 (36)	1.81% (2.76%)	68 (51)	23 (39.3)	0.035% (0.047%)

^{*} Denmark and Belgium have only data with hospitals days available for 2009.

[†] The live-born infants (Z38) of Luxembourg and Spain are not included in the total hospital days, and this could lead to an overestimation of the hospital expenditures.

3.3. Comparing public spending in the EU-21 for illegal drug and alcohol treatment in hospitals

Public spending in the EU-21 for illegal drug and alcohol treatment in hospitals is presented in table 5. The public spending of six EU member states (Belgium, Denmark, France, Luxembourg, the Netherlands and Spain) with data limited to general and/or specialised hospitals is extrapolated to all types of hospitals. To do this, we pro-rated total hospital expenditures of the six EU countries in proportion to the number of patient days associated with substance abuse treatment. Table 1 and 3¹³ provide the proportion of hospital days attributable to illegal drug and alcohol treatment. The weighted average of the 15 EU countries, based on population, is 0.56% for illegal drugs and 2.18% for alcohol.

Table 5: Public expenditures for illegal drug and alcohol treatment in hospitals for 21 EU countries*, 2010

	Public expenditures (million euros)	Public expenditures per capita (euros)	Public expenditures in % of GDP
Illegal drug treatment	1,703	4.7	0.020%
Alcohol treatment	5,930	16.5	0.069%
Total	7,633	21.2	0.089%

* Source for population and GDP of EU countries: Eurostat (2013e, 2013f)

Table 5 shows that the total EU-21 spending for illegal drug and alcohol treatment in hospitals is estimated to be 7,633 million euros or 21 euros per inhabitant; the share of GDP is 0.089%. The hospital expenditures for alcohol treatment are three times higher than the expenditures for illegal drug treatment, due to the higher number of hospitalization days for alcohol treatment (table 1 and 3 report 28 hospital days for alcohol treatment per 1,000 capita as compared to 7 days for illicit drug treatment).

4. DISCUSSION

This cross-country comparison provides insight into the public spending of governments in the EU on substance abuse treatment in hospitals. A uniform methodology based on international databases is used to provide consolidated data on the public expenditures for drug and alcohol treatment in hospitals. The total public spending on hospital-based substance abuse treatment is estimated to be 7.6 billion euros in the 21 EU countries. Three-quarters (77.7%) of these public expenditures are used for alcohol treatment, while the remaining quarter (22.3%) is used for illegal drug treatment. That public spending for alcohol treatment exceeds spending for illegal drug treatment is consistent with previous studies (e.g. Fenoglio, Parel & Kopp, 2003; Collins & Lapsley, 2002; Single et al., 1998). As expected, the estimate of 5.9 billion euros in public expenditures for alcohol treatment in hospitals is

lower than the estimate of Rehm et al. (2012). They estimated a European cost, including private expenditures, of 6.3 billion euros for alcohol treatment and prevention. It is difficult to compare these studies and draw conclusions given the lack of data for all EU member states. This points to the importance of an international database with complete data for all EU countries. In the United States, data collection on the nominal costs of billed services attached to each individual client under, e.g., Medicaid is standardized across the fifty states. That is not the case in Europe (Collins et al., 2010).

This study also showed a large variation in public spending on substance abuse treatment in hospitals across the 15 EU member states that did provide comparable data. These results are discussed by looking at the explaining factors, the policy implications and limitations of the study.

Explaining factors

The public spending on hospitalized substance abuse treatment can be explained by a variation in three factors: 1) the hospital cost per day, 2) the organization of substance abuse treatment and 3) the prevalence of problem illegal drug use and alcohol dependence. We elaborate on each in turn.

The hospital cost per day is influenced by the structure of health care expenditures. The health expenditures in Central-East and Eastern Europe are much lower than in the other EU countries, because these countries have lower GDP per capita (Shield et al., 2012). There is a strong (Pearson) correlation between GDP per capita and the public expenditures per hospital day ($r = 0.638$, $p = 0.002$). Next, the mix of public and private health financing may help explain differences in *public* spending on health care (see additional file 1). Most Eastern European countries are characterized by a limited share of public financing: 56% in Bulgaria, 64% in Hungary and 68% in Slovakia (one exception is 83% in the Czech Republic) (Eurostat, 2013g). The economic crisis affected the public-private financing mix for countries such as Bulgaria and Slovakia, since they reported a substantial increase of the private contribution and a corresponding decrease in public expenditure in 2010 (EMCDDA, 2014a). It is very likely that Denmark, Sweden and the Netherlands reported the highest public expenditures per hospital day partly because their proportion of public financing is high: the Netherlands 86%, Denmark 85% and Sweden 82%. Moreover, in Eastern Europe it appears that informal patient payments continue to exist despite reforms within the health care sector (Lewis, 2004; Stepurko, Pavlova, Gryga & Groot, 2010). Private health insurance and out-of-pocket expenditures have a negative impact on the accessibility to health care, and this is linked to the high share of private financing (Thomson, Foubister & Mossialos, 2009). Limited accessibility may lead to an additional limitation of the number of hospital days.

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Moreover, public hospital expenditures are influenced by the source of financing, i.e. general taxation or insurance-based systems. Countries with predominantly insurance-based systems (e.g. Belgium, France, the Netherlands, Germany and Luxembourg) have higher health care expenditures, because the insurance-based system is characterized by a lower degree of control over expenditures (Pestieu, 2006).

The number of hospital days directly influences public spending for alcohol and drug treatment. These hospital days are in turn influenced by the *organization of substance abuse treatment* in a country (Montanari et al., 2011). The Western European countries Austria and Germany reported a high number of hospital days per capita attributable to alcohol and illegal drug treatment. The Eastern European countries Poland and Slovakia also reported high hospital days, especially for alcohol treatment. This high number of hospital admissions/days suggests that these countries organize drug treatment mainly inside hospitals, while countries with a low number of hospital days may have more of a tradition of establishing specialised treatment outside hospitals. However, an alternative explanation is that the latter countries have shorter hospital stays. In fact, a couple of countries with a low number of alcohol hospital days reported a shorter average in-patient length of stay for alcohol treatment (e.g. Romania: 11.3 days, Lithuania: 8.3 days and Sweden: 4.7 days) than Austria (17.6 days) and Germany (13.3 days). The same conclusion can be drawn for illegal drug treatment, except for Bulgaria which reported longer stays for alcohol (27.6 days) and illegal drug treatment (18 days) (Eurostat, 2013h). Furthermore, the profile and the preferences of substance abusers may also influence the organization of drug treatment. Substance abusers have a personal preference for a specific type of treatment service that is based on indicators such as flexibility, accessibility, proximity of treatment service, etc. (Vanderplasschen, De Bourdeaudhuij & Van Oost, 2002; Appel & Oldak, 2007). Moreover, clients may prefer outpatient treatment because it entails fewer out-of-pocket expenses. Outpatient treatment allows female clients to continue caring for their children (Khan et al., 2013).

In addition to the hospital cost per day and the organization of substance abuse treatment, we investigated whether *the prevalence of illegal drug and alcohol problems* in a country can explain the number of hospital days and the expenditures that come with it. One might expect that the more a country is confronted with substance abusers, the higher the hospital occupation for these problems will be. In fact, this is the presumption of economic-cost studies using hospital days to estimate the hospitals costs for treating substance abuse. However, we found no positive correlation between these two variables. For example, Latvia and Bulgaria reported a high prevalence of problem drug use in combination with a low number of hospital days. In this respect, the way a country's drug treatment

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is organized influences the relation between prevalence of substance abuse and number of hospital days. Furthermore, the prevalence rates could be affected by cultural factors and social norms regarding substance use. Rehm, Shield, Gmel, Rhem & Frick (2012) argue that alcohol is highly culturally embedded in Southern-European countries, therefore people in the region are more likely to deny alcohol dependence and this may result in lower admissions to hospitals. This shows that monitoring (trends in) the prevalence of problem drug users will not suffice to monitor the (trends) in public expenditure on substance use treatment.

It should be noted that the expenditures on alcohol and illicit drug treatment cannot be explained solely by looking at the combination of the prevalence of problem illegal drug use and alcohol dependence, the hospital cost per day and the organization of substance abuse treatment in a country. Other factors such as a country's cultural and social norms regarding substance use, its illicit drug or alcohol policy or the labor costs could play a role as well (EMCDDA, 2011). We identified an impact of these factors for the two outliers of this EU cross-country comparison. First, Sweden was the outlier in public spending for illegal drug treatment. Its public expenditure of 13 euros per capita can be explained by the high cost of hospitalization and the high proportion of hospital days attributable to illegal drug treatment (see table 1). Sweden's drug policy may be an additional explanatory factor since Sweden prioritizes a drug free society and abstinence-driven treatments (Hallam, 2010). This approach may also be more expensive than other drug treatment policies. Cost-benefit analyses need to be consulted to determine which drug treatment investments bring about (financial) gains. Second, Luxemburg spends the most in Europe per capita on hospital expenditure for both alcohol and illegal drug treatment. The prevalence of problem illegal drug use (6.2 per 1.000 capita) (EMCCDA, 2013b) and the high proportion of drug clients entering inpatient centers (79%) (EMCDDA, 2014b) influences the number of hospital days for illicit drugs. For alcohol, the share of hospital days could not be explained by the prevalence of people with alcohol dependence. We speculate that the high expenditures for Luxembourg could be ascribed to the smaller scale of drug treatment organization that imposes more costs on the health care budget. These examples demonstrate that multivariate research is necessary to determine which factors affect public spending on substance abuse treatment.

Policy implications

This study measured how much European governments spend treating illicit drug and alcohol problems in hospitals. Governments play an important role in financing health care, since governments in the EU-21 finance on average 73% of the health expenditures (see additional file 1). This differs from the United States where less than 50% of health spending is publicly financed. We

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would like to highlight the importance of measuring direct treatment costs in political and policy decision-making. The comparability of results across countries provides information for policymakers and public administration (EMCDDA, 2008). The impact of substance abuse treatment in hospitals on a country's budget is presented, and these data can be used to illustrate the budgetary consequences of different drug policies. The cost information in this study also provides a valuable basis for assessing total public spending on substance abuse treatment, not just hospital-based spending. It can also contribute to the evaluation of substance abuse interventions (French & Martin, 1996; Thavorncharoensap et al., 2009), since the public expenditure studies provide an important component for economic evaluation studies: the public expenditures serve as the independent variable and outcomes (e.g., OD deaths) as the dependent variable. Moreover, these economic evaluation studies can be used to conduct more complete economic evaluations of substance abuse treatment in EU countries. For example, country profiles could be developed compiling information on treatment organization and budgetary impact. Ideally, these efforts lead to an evidence-based policy where financial resources are assigned to cost-effective substance abuse treatment (Wood et al., 2010). However, it remains to be seen if governments will be willing and able to make these investments in exchange for benefits in the long-term (i.e. cost savings and reduced human suffering). For example, Rehm et al. (2012) estimated that less than 10% of people with alcohol dependence in the EU receive treatment¹⁴. A 10% increase in health care coverage for hospital-based alcohol treatment in Europe would bring about an estimated 593-million-euro increase in hospitals' public expenditure.

Study limitations and recommendations

This study uses data from the Eurostat database to measure how much European governments spend on treating illegal drug and alcohol problems in hospitals. International databases facilitate cross-country comparisons that could highlight the impact of substance abuse on public health budgets (Degenhardt et al., 2008). Our cross-country comparison is restricted to hospitals since data were unavailable for other types of treatment providers. It is not clear which proportion of the drug and alcohol clients receive hospital treatment. The Treatment Demand Indicator (TDI¹⁵) used in the EU, cannot determine the proportion of substance use clients treated in hospitals since it only distinguishes between the proportion of illegal drug clients in inpatient¹⁶ and outpatient centers. The TDI shows that the proportion of reported clients entering inpatient centers for drug-related problems varies to a large extent by country (from 2% in France to 79% in Luxembourg) (EMCDDA, 2014b)¹⁷. Notwithstanding the limitations of the current analysis, the impact of hospital expenditures for drug and alcohol treatment on the public budget should not be underestimated. Multiple studies (e.g. Costello, Copeland, Cowell & Keeler, 2007; EMCDDA, 2011; NCCMH, 2011) show that the unit cost for

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hospital treatment is much higher than for outpatient treatment services. For example, inpatient detoxification in England is provided at a cost of 200 euros per patient per day and outpatient detoxification is provided at a cost of 8 euros per patient per day (Gossop & Strang, 2000). Moreover, Andlin-Sobocki, Jönsson, Wittchen and Olesen (2005) indicate that the cost for hospital care due to brain disorders in Europe (including alcohol and illicit drug use disorders) dominates total treatment cost. Public expenditure studies indicate that a large share of the public expenditures for substance abuse treatment is attributable to care in hospitals. For example, in Belgium the share of hospital treatment for alcohol and illegal drug use amounts to as much as 90.66% of the total public spending for substance abuse treatment (Vander Laenen et al., 2011). On the other hand, a Swedish study, with a research scope limited to illegal drugs, found a much lower share of hospital treatment. Ramstedt (2006) reported that hospital expenditures made up only 16% of the total illegal drug abuse health spending. In other words, insight into the expenditures on substance abuse treatment via hospital expenditures is complex, since it varies with the investigated substance and with several other factors discussed above.

The analysis of international data for cross-country comparison purposes illustrated that, despite the great potential of these data(bases), much information is still lacking today. Ideally, these databases should provide hospital charges categorized according to diagnosis-related groups, as is the case with the Medicaid database in the United States (Collins et al., 2010). However, the Eurostat database is limited to public health care expenditures by provider (e.g. ambulatory health care, nursing and residential care facilities). In order to estimate the drug- and alcohol-related percentages of these budgets, the health care activities by diagnosis are required for outpatient and inpatient treatment services (apart from hospital-based treatments). Further research is necessary to develop variables in international databases that provide data for outpatient treatment sessions for substance abuse, inpatient days for substance abuse, consultations for substitution treatment, drug treatment counseling in prisons, etc. This data would allow researchers to compare public expenditures for different types of treatment regimes. Additionally these data could be used for more in-depth economic evaluations, i.e. whether specific treatment modalities are more cost-effective than others (Andlin-Sobocki, 2004; Babor et al., 2010).

In our study in particular, we were confronted with the significant limitations of the Eurostat database. In the Eurostat database, hospital days are limited to primary diagnosis and health expenditures are not subdivided by inpatient, emergency or outpatient service. Next, the Eurostat data are sometimes incomplete because countries are not always able to provide data for all types of hospitals (general, mental health and specialty hospitals). A number of EU countries (Belgium, Denmark, France,

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Luxembourg, the Netherlands and Spain) could not report data for mental health hospitals. Furthermore, the external causes of morbidity (the ICD-10 codes V00-Y84), such as accidents, intentional self-harm and assault (WHO, 2010) are not included in the total hospital days, resulting in a higher proportion of hospital days attributable to drugs/alcohol. This in turn leads to an *overestimation* of hospital expenditures for alcohol and illicit drug treatment in hospitals. Finally, Eurostat collects health care data via various public and private information sources in EU countries. These data reflect the country-specific way of organizing and reporting health care, and this may diminish comparability across countries (Eurostat, 2013i). In this respect, the health expenditures collected by the System of Health Accounts (SHA) differs from the general government expenditures by COFOG (Classification of the Functions of Government) function¹⁸. The SHA/COFOG differences highlight the uncertainty of estimates due to differences in information sources.

With these limitations in mind, we recommend expanding the Eurostat data collection of hospital discharges with secondary diagnoses. Furthermore, the data coverage of the Eurostat database should be improved to obtain more reliable results for the EU member states since the consistency of reporting is indispensable for international benchmarking of budget expenditures across countries (Prieto, 2010).

5. CONCLUSION

This study highlighted the need for cross-country comparison of the public expenditures for substance abuse treatment. Despite limitations, this study presents the public spending for illegal drug and alcohol treatment in hospitals of 21 EU member states. The study corroborates other studies that found that public expenditures for alcohol treatment exceed public expenditures for illegal drug treatment. Multiple factors may influence the number of hospital days and the expenditures that come with it. In this respect, we found a strong correlation between GDP per capita and the public expenditures per hospital day. Other factors should be included in the future analysis of public expenditures for substance abuse treatment, such as the drug policy in a given country (in this study, we especially discussed the case of Sweden) and the social norms regarding alcohol consumption (in this study, we especially discussed various Eastern European countries).

6. APPENDIX

Appendix 1– Percentage of health expenditures financed by the general government

Table 6: General government share of total current health expenditure for 21 EU countries, 2010*

Country	Public spending (%)
Austria	77.09
Belgium	75.09
Bulgaria	56.21
Cyprus	42.12
Czech Republic	83.33
Denmark	84.56
Finland	74.39
France	77.46
Germany	77.22
Hungary	64.28
Latvia	59.65
Lithuania	71.48
Luxembourg	82.42
Netherlands	86.09
Poland	71.68
Portugal	67.38
Romania	79.92
Slovenia	73.09
Slovakia	67.82
Sweden	81.51
Spain	73.87
Mean (SD)	72.70 (10.57)

*Data for 2010, except for Bulgaria (2008), Cyprus (2008), Latvia (2009) and Luxembourg (2008).

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8. ENDNOTES

¹ DALY is a metric to determine the burden of disease. Therefore, it takes into account the years of potential life lost (YLL) due to premature mortality and the years of productive life lost (YLD) due to disability.

² The number of people with an alcohol use disorder in treatment is estimated by taking into account the prevalence of 11.9 million people with alcohol dependence and the treatment coverage (in- and outpatient) with a minimum of 8.7% and maximum of 10.2% (Rehm et al., 2012).

³ The analysis of international databases was part of a larger study on public expenditure on drug treatment that the authors conducted for the EMCDDA in 2013 (the reference will be updated after review).

⁴ Eurostat also reports “general government expenditure by function (COFOG)”. However the COFOG database can only provide data for 19 EU member states (instead of 21 EU member states with the SHA database), since there are no data for Belgium, Spain, Romania and Slovakia. Furthermore, this database does not make a distinction between expenditures for general hospitals, mental health and substance abuse hospitals and specialty hospitals (other than mental health and substance abuse hospitals). Consequently, it would not be possible to estimate hospital expenditures for general and specialty hospitals in Denmark, France, Luxembourg and Netherlands.

⁵ The specialty hospitals consists of acute care hospitals; emergency centers; orthopedic hospitals or specialty sanatoriums primarily engaged in providing medical post-acute care, rehabilitative and preventive services; traditional medicine hospitals; and special hospitals for infectious disease (tuberculosis hospitals, hospitals for tropical diseases).

⁶ The International Classification of Diseases (ICD) is the international coding system of diseases and other health problems. This standard diagnostic tool is used for epidemiology, health management and clinical purposes.

⁷ The European Union reached its current size of 28 member countries with the accession of Croatia on 1 July 2013. Since the analysis is based on 2010 data, Croatia is not included in this study.

⁸ The authors also tested an extrapolation by regression. However, the regression with hospitals days for substance abuse treatment regressed on GDP per capita and prevalence of problem substance use was not significant ($P > 0.05$).

⁹ The health expenditures are indispensable to estimate the cost per hospitalization day. An extrapolation of the health expenditures by population would neglect the strong correlation between GDP and hospital expenditures.

¹⁰ All means in tables 1 to 4 are calculated with the simple average method.

¹¹ Sweden (1507 euros), Austria (1259 euros), Finland (904 euros) and Germany (893 euros) have the highest hospital expenditures per capita.

¹² Figure 1 and 2 give an impression of the relationship between prevalence and hospital days for substance abuse. This comparison should be interpreted with caution, since hospital days are limited to primary diagnosis of mental and behavioral disorders due to psychoactive substance use or alcohol use.

¹³ The data of 15 EU member states are used for extrapolation, because these countries provided data to estimate the public expenditures for all hospital types.

¹⁴ Wittchen et al. (2011) state that only 25% of persons with mental disorders receive professional mental health treatment.

¹⁵ The TDI is a monitoring tool developed by the EMCDDA to gain insight into the characteristics, risk behaviors and drug use patterns of people with illegal drug problems. To this end, data are collected on the number and profile of clients entering drug treatment during each calendar year. This tool is being used by 30 countries (28 EU member states, plus Norway and Turkey) who send their national data to the EMCDDA.

¹⁶ The inpatient centers include therapeutic communities, private clinics, units in a hospital and centers that offer residential facilities.

¹⁷ This proportion should be interpreted with caution since the data coverage of TDI ranges from 14% to 100% of existing inpatient units in the registering countries.

¹⁸¹⁸ The COFOG is restricted to government administrative sources and focuses on the classification of transactions in government-funded health care (Eurostat, 2011). The COFOG hospital services expenditures (code GF0703) of 13 EU member states are compared to the SHA hospital expenditures (code HP1). The COFOG expenditures deviate from the expenditures reported on by the SHA: a difference of less than 10% in health expenditures is retrieved for 6 EU member states (Bulgaria, Czech Republic, Germany, Cyprus, Lithuania and Slovenia) and more than 10% for 7 EU member states (Latvia, Austria, Poland, Finland, Hungary, Portugal and Sweden). For Portugal, the hospital expenditure measured by COFOG (749 million euros) is only 12.8% of the expenditure collected by SHA (5,843 million euros).

STUDY 3

THE GENERALISED COST-EFFECTIVENESS ANALYSIS OF ALCOHOL INTERVENTIONS:
A COMPARATIVE MEASURE?THE BELGIAN ALCOHOL POLICY AS A STARTING POINT FOR A CROSS-COUNTRY COMPARISON

ABSTRACT

Background: Since the start of the 2000s, Generalised Cost-Effectiveness Analysis (GCEA) studies have been conducted to simulate the cost-effectiveness of an alcohol policy mix, and to evaluate the current alcohol policy of a country. It is hypothesised that GCEA could also be a useful tool to compare the cost-effectiveness of alcohol policies in different countries. The purpose of this study is to investigate if these GCEA studies could be used in a cross-country comparison. A Belgian GCEA on alcohol interventions is conducted in order to explore the possibility for a cross-country comparison with other GCEA studies from Australia, Estonia and Denmark.

Methods: Firstly, the cost-effectiveness of six alcohol interventions (random breath testing, mass media “drink driving” campaign, increased taxation, advertising ban, reduced hours of sale and brief intervention in primary care) was investigated for Belgium with the WHO cost-effectiveness modelling framework. Secondly, a cross-country comparison of GCEA studies on alcohol was conducted. The Belgian and Estonian cost-effectiveness ratios were discussed more in detail since both studies used the WHO framework.

Results: The combination of the six alcohol interventions in Belgium could annually save up to 18,000 DALYs and the implementation of these interventions would cost approximately 40.3 million euros per year. Advertising ban (35 euros per DALY averted) and increased taxation (172 euros per DALY averted) appear to be the most cost-effective interventions to reduce hazardous alcohol use. In fact, the cross-country comparison suggests that the legislative interventions (increased taxation and advertising ban) are the most cost-effective strategies in Australia, Belgium, Estonia and Denmark. Furthermore, Estonia generates better cost-effectiveness ratios than Belgium, especially for random breath testing, since the prevalence of hazardous drinking and alcohol-related traffic accidents is higher in the Estonian population.

Conclusion: A cross-country comparison of GCEA studies is confronted with conceptual and methodological differences across studies. The GCEA studies should use a uniform methodology, such as the WHO framework, in order to facilitate comparisons on the cost-effectiveness of different alcohol policies. During the contextualisation process of a GCEA study, however, uniformity of the

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methodology may still be endangered by the input of parameters (such as the intervention effects, the cost calculation of the interventions, etc.).

Key words: cost-effectiveness, alcohol, interventions, Belgium, cross-country comparison

1. INTRODUCTION

The WHO (2009) estimated that alcohol is responsible for 69 million disability adjusted life years (DALYs¹) and alcohol is ranked as the third risk factor for burden of disease in the world (Lim et al., 2012). The economic impact of alcohol is as damaging to the nations as its health effects (Burke, 1988). In Europe, the social cost attached to alcohol was estimated at 1.3% of the GDP: 125 billion euros in 2003 (Anderson & Baumberg, 2006), and 156 billion euros in 2010 (Rehm, Shield, Rehm, Gmel & Frick, 2012). More particularly, Belgian data confirm an even higher impact of alcohol on society. A Belgian social cost study on alcohol found a social cost proportion of 2.5% of GDP in 1999, equivalent to 6 billion euros (Degreef, Pacolet & Bouten, 2003). Moreover, a more recent study on the public expenditures for drug control and drug problems in Belgium indicated that spending on alcohol is much higher in comparison to the spending for illegal drugs, psychoactive medication and tobacco. Alcohol accounts for 64.8% of drug-control spending and an even greater share (75.4%) of drug treatment spending (Vander Laenen, De Ruyver, Christiaens & Lievens, 2011).

It is clear that this burden of alcohol poses several challenges for public management. Moreover, the governmental budgets for alcohol policy are limited due to the current economic crisis and the resulting austerity. Health economic evaluations may provide valuable information for policy makers, in order to allocate the public resources for alcohol policy in the most efficient and effective way. These studies are in keeping with the New Public Management (NPM) movement's emphasis on policy evaluation in governmental operations. This NPM provides a universal economic model of governance and organization with a focus on efficiency and effectiveness (Osborne & Gaebler, 1992; Behn, 2001; Pollitt, 2003). Moreover, NPM has encouraged economic evaluation research, these tools and ideals of evaluation studies are as relevant to alcohol policy as they are to other government functions such as health care, education and police. For example, the cost-effectiveness of alcohol prevention and treatment models has been assessed by a number of cost-effectiveness analysis (CEA) studies (e.g. Tobler & Stratton, 1997; Raistrick, Heather & Godfrey, 2006; Månsdotter, Rydberg, Wallin, Lindholm & Andréasson, 2007). In addition, the cost-effectiveness of an alcohol policy mix has been studied with the Generalised Cost-Effectiveness Analysis (GCEA). Using this GCEA it is possible to simulate the most cost-effective alcohol policy mix of a country and to evaluate the current alcohol policy. Firstly, GCEA studies measure which mix of government interventions is likely to produce the greatest effectiveness in terms of costs and health outcome. Therefore, the intervention strategies to reduce the burden of hazardous alcohol use are evaluated by their comparative impact on population-level health. Secondly, the interventions are evaluated with respect to a counterfactual of "doing nothing" (Murray, Evans, Acharyan & Baltussen, 2000) and this null scenario provides information for decision-makers on what could be achieved if they reallocated the expenditures for alcohol policy (Edejer et al., 2003). The

first GCEA for alcohol was carried out at the level of WHO regions by Chisholm, Rehm, Van Ommeren & Monteiro (2004). Furthermore, three generalised cost-effectiveness studies (Cobiac, Vos, Doran & Wallace, 2009; Holm, Veerman, Cobiac, Ekholm & Diderichsen, 2014; Lai, Habicht, Reinap, Chisholm & Baltussen, 2007) determined if a specific country mix (Australian, Danish and Estonian) of alcohol interventions represented an efficient use of resources. The country level analyses showed that an increase in taxation and advertising bans should be the highest priority of a cost-effective alcohol policy. Chisholm et al. (2004) confirmed that these population-wide measures imply the most cost-effective response in populations with moderate or high alcohol use.

The GCEA could also be a useful tool to compare the cost-effectiveness of alcohol policies in different countries, therefore the current study investigates if GCEA studies could be used in a cross-country comparison. An analysis of different government intervention mixes may enhance the comparison of alcohol policies between countries. In fact, a cross-country comparison of the cost-effectiveness of alcohol interventions would enable to monitor alcohol interventions with benchmarking information and this may potentially improve the efficiency and effectiveness of alcohol policy (Ritter, 2007).

The current study investigates the possibility to conduct a cross-country comparison with GCEA studies. In order to identify methodological issues during a GCEA cross-country comparison, we start with an evaluation of the cost-effectiveness of the Belgian alcohol policy interventions and we illustrate a comparison across countries. Firstly, the Belgian setting is an interesting case from a public management point of view because the epidemiological² and economic setting of the Belgian alcohol policy indicates room for improvement. The optimal intervention mix will point out if improvements of the Belgian alcohol policy are possible by changing the weight of interventions. This will result in recommendations for health policy-makers and programme managers. Secondly, this Belgian GCEA allows us to identify methodological issues during the execution of the GCEA and to investigate the feasibility of a cross-country comparison with other countries that already executed generalised cost-effectiveness studies. The number of executed GCEA studies on alcohol is limited to three countries: Australia, Estonia or Denmark. This Belgian GCEA study expands the cross-country comparison with a country of the central-western and western European country group, by doing so, countries with different drinking traditions and patterns could be compared³.

The paper has been organized in the following way. The first part deals with the GCEA methodology; it describes the approach that is used for selecting the interventions and collecting data for Belgium. The next section outlines the results; the cost-effectiveness of Belgian alcohol interventions is presented and compared across countries. Finally, the methodological issues concerning a cross-country comparison with GCEA studies are discussed.

2. METHODS

The GCEA, first developed by the World Health Organization CHOosing Interventions that are Cost-Effective (WHO-CHOICE: <http://www.who.int/choice>) project, is a methodology that exceeds the cost-effectiveness analysis (CEA) by overcoming a number of its limitations (e.g. the evaluation is restricted to a single new intervention; Murray et al., 2000). Its application provides information of multiple interventions at country (or regional) level by generalising results from one setting to another (Edejer et al., 2003), and this enables the identification of the optimal mix of interventions. Furthermore, the method investigates to what extent the current intervention mix is cost-effective, and if the proposed new intervention is appropriate⁴ (Hutubessy, Chisholm, Edejer & WHO-CHOICE, 2003). Therefore, it eliminates the effects of current alcohol policy by creating a scenario of no interventions, and the effects of (new or current) interventions are compared with this null situation (Edejer et al., 2003). These key features of the GCEA should make it a comparative measure.

The current study used the WHO-CHOICE method for the Belgian GCEA, since it is a standardised data tool that allows cross-country comparisons in the next phase of the research. The WHO developed this method to simulate the cost-effectiveness of multiple interventions at the country level. Therefore it uses a multi-state population model (PopMod), this tool simulates the evolution in time of a population subject to births, deaths and a disease condition (in this case hazardous alcohol use). The effect of alcohol interventions on the health of the Belgian population (10 years implementation of the intervention) was derived via PopMod and the population-level impact was expressed in disability adjusted life years (DALYs⁵). A contextualisation was conducted by collecting Belgian-specific demographic and epidemiological data, and Belgian-specific intervention costs. In addition, the effectiveness of alcohol interventions has been investigated by consulting review studies. These data were entered in the standard spreadsheets of the WHO-CHOICE tool and during the simulation the future intervention outcomes and costs were discounted at a rate of 3% (over the 10-year implementation period) as recommended by Edejer et al. (2003)⁶. Uncertainty analysis of the effects (with a range of plus and minus 20% of the baseline effect) have been conducted to take into account the uncertainty around the effectiveness of interventions (or elasticities for tax)⁷.

Data

The alcohol interventions are supposed to change incidence, prevalence and mortality of alcohol-related diseases and injuries, therefore epidemiological data were collected. The prevalence of hazardous alcohol use originated from the Belgian health interview survey 2008 (IPH, 2010). The Directorate-general Statistics and Economic information provided mortality rates from 2008⁸. Furthermore, the calculation of DALY requires disability weights, the measure for the decline of health

associated with alcohol use disorders (Rehm & Frick, 2010). The study of Stouthard et al. (1997) provides a comprehensive set of disease-specific disability weights in a Western European context.

The intervention costs are assessed in Euros for the year 2008⁹ and derived from the public expenditure study *Drugs in Figures III* (Vander Laenen et al., 2011). The missing intervention costs (e.g. medical expenses for a brief intervention and budget for a media awareness campaign on alcohol) were collected by consulting governmental administrations. The focus lies on the public expenditures (including social security payments) and private costs (e.g. non-refundable part of medical expenses and sponsoring) that are necessary to deliver each intervention; meaning that tax revenues from alcoholic beverages are beyond the scope of this study. Moreover, this study does not take into account costs for the family or intimates, time costs of the patient to participate at the interventions and productivity losses. These costs have neither been estimated in the previous GCEA studies on alcohol (Cobiac et al., 2009; Holm et al., 2014; Lai et al., 2007)¹⁰, possibly due to methodological problems with these cost estimates (Moller & Matic, 2010).

Interventions

The selection of interventions that reduce alcohol-attributable harm started with a comprehensive review of the literature (Anderson & Baumberg, 2006; Babor et al. 2010; Mulvihill, Taylor & Waller, 2005; Ludbrook et al., 2002; Ludbrook, 2004). The literature review resulted in a global list of 37 alcohol interventions and this list was reduced to a final selection of six interventions based upon three considerations: the effectiveness of alcohol policy, the cost-effectiveness of interventions and previous research. Firstly, Anderson & Baumberg (2006) argue that an effective alcohol policy should focus on the following five domains: (1) policies that regulate the alcohol market; (2) policies that reduce drinking and driving; (3) policies that support education, communication, training and public awareness; (4) policies that support the reduction of harm in drinking and surrounding environments; (5) policies that support advice and treatment for hazardous and harmful alcohol consumption and alcohol dependence. From this point of view, the optimal policy mix will only be possible if at least one intervention of each domain is selected¹¹. Secondly, the study takes into account the effect of each intervention, this means that interventions with a high degree of effectiveness and cost-effectiveness are more likely to be selected. To this end, systematic reviews or meta-analyses were consulted. For example, the programme for drunk driving offenders by placing an interlock that prevents an impaired driver from operating the vehicle is excluded from this study since there is no review study available with evidence that alcohol locks reduce alcohol-related crashes (Marques, 2009). Thirdly, given the aim of a cross-country comparison, the selection process of interventions is also determined by

previous GCEA studies, meaning that similar cost-effective interventions were selected and the selection was limited to six interventions¹².

The selection process above resulted in six interventions for the GCEA of the Belgian alcohol policy. The intervention effects from the literature are presented in terms of change in alcohol consumption¹³ or road traffic crashes and injuries.

1. Random breath testing (RBT): i.e. programmes that randomly stop drivers to detect and prevent driving with a blood alcohol concentration of 0.5g/l. Different studies consider RBT as an effective strategy to reduce alcohol-related traffic crashes and injuries. In fact, review studies on RBT retrieved a 18% decline in injuries (Peek-Asa, 1999) and crashes (Shults et al., 2001). This GCEA study took into account a 18% reduction in fatal traffic injuries and a smaller reduction of 15% for non-fatal injuries¹⁴ (Chisholm et al., 2004).

2. Mass media “drink driving” campaign: i.e. the nationwide implementation of a mass media campaign to prevent drinking and driving. A well-executed mass media campaign is effective in reducing alcohol-related crashes according to Elder et al. (2004). This systematic review of eight studies found a median decrease in injury-producing crashes of 10%.

3. Increased taxation: i.e. an increase the alcohol price by raising the excise taxation with 25% or with 50%. Alcohol consumption is determined by the price, therefore the effects of taxation are measured in terms of price elasticity¹⁵. The results of the meta analysis of Wagenaar, Salois & Komro (2009) were consulted: the means of reported elasticities are -0.46 for beer, -0.69 for wine and -0.80 for spirits.

4. Advertising ban: i.e. a comprehensive advertising ban (e.g. via TV, radio, billboards, etc.) on alcoholic products. This intervention is recommended since research (e.g. Tapert et al., 2003; Anderson, de Bruijn, Angus, Gordon & Hastings, 2009; Winpenny et al., 2012; Bosque-Prous et al., 2014) indicated that alcohol advertisements influence adolescents and adults with heavy drinking patterns. Moreover advertising bans are recognised as a highly cost-effective measure to reduce harmful alcohol use (Anderson, 2009). The study of Saffer and Dave (2002), a pooled time-series analysis of data from 20 countries over a period of 26 years, found that in the past an increase of one ban (of media or beverage type) reduces consumption by 5% to 8%.

5. Reduced hours of sale: i.e. a restriction of the purchase of alcohol by reducing hours of sale among retail outlets. Popova, Giesbrecht, Bekmuradov & Patra (2009) and Hahn et al. (2010) concluded that decreasing hours of sale (by 2 hours or more) is an effective strategy to prevent alcohol-related harm. Nevertheless these review studies were not able to report a mean effect. Therefore, the results of the study of Norström and Skog (2005) were used since it was the only study that measured the effect on the alcohol consumption for a European country. The authors showed that the Saturday opening of alcohol retail shops in Sweden increased alcohol sales and consumption with 3.7%.

6. Brief intervention in primary care: i.e. counselling for at-risk drinkers by a general practitioner. An overload of CEA studies on brief interventions is available. The meta-analyses of Bertholet, Daeppen, Wietlisbach, Fleming & Burnand (2005) and Kaner et al. (2009) reported a reduction in alcohol consumption of -38g/week¹⁶. Moreover, Whitlock, Polen, Green, Orleans & Klein (2004) systematically reviewed studies on behavioural counselling interventions in primary care and revealed a 13% to 34% reduction in weekly drinks. In line with these results, this GCEA study took into account an effect of 22% reduction in alcohol consumption (Moyer, Finney, Swearingen & Vergun, 2002; Chisholm et al., 2004).

3. RESULTS

Belgian optimal intervention mix

Table 1 presents the annual costs and effects of different interventions to reduce the hazardous alcohol use in Belgium. The effectiveness of the interventions (in terms of DALYs averted per year) ranges from 637 DALY for the mass media “drink driving” campaign to 12,274 DALY for increased taxation with 50% (See Table 1). There is also large variability in the yearly cost of the interventions: from 0.1 million euro for an advertising ban to 25.7 million for random breath testing. In terms of cost-effectiveness, an advertising ban is the most cost-effective intervention to reduce alcohol burden, a volumetric taxation (+50%) and a reduction of opening hours complete the top three. The cost-effectiveness of these three interventions ranges from 35 to 185 euros per DALY saved, this is in contrast with the random breath testing that costs more than 26,000 euros per DALY averted. The combination of the six interventions could annually save 17,990 DALYs¹⁷, this would cost 40.3 million euros per year.

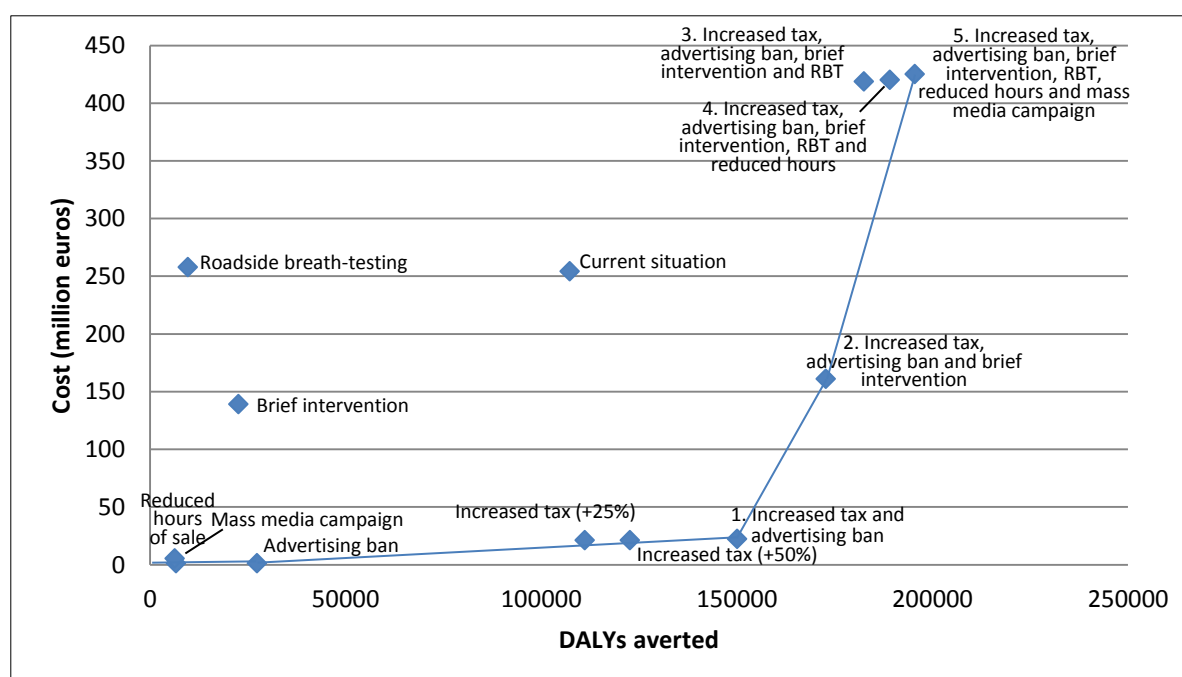
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Table 1: Cost-effectiveness of alcohol interventions in Belgium

Intervention	DALYs averted per year (a)	Cost per year (million Euros) (b)	ACER ¹⁸ (Euros per DALY saved)(b)/(a)
Current situation (2008) ¹⁹	10,731	254,1	23,677
Increased taxation (current +25%)	11,120	2,1	190
Increased taxation (current +50%)	12,274	2,1 ²⁰	172
Random breath testing	974	25,7	26,400
Mass media “drink driving” campaign	637	0,5	810
Advertising ban	2,736	0,1 ²¹	35
Reduced hours of sale	666	0,1	185
Brief intervention in primary care	2,267	13,9 ²²	6,123
Combination of interventions	17,990	40,3	2,241

Figure 1 demonstrates the optimal intervention mix for a 10-year period. From a cost-effectiveness point of view, the best combination in case of two policy options is increased taxation and advertising ban; and the brief intervention in primary care should be implemented as a third policy intervention. The figure also illustrates the cost-effectiveness of the current situation (2008) and shows the potential improvements (in terms of averted DALYs) by implementing the combination of the six studied interventions.

Figure 1: Cost-effectiveness of alcohol interventions in Belgium (over 10 years)



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Furthermore, the uncertainty analysis showed that the impact of plausible variations in the intervention effects affected the results marginally. The interventions retain their classification of highly cost-effective or cost-effective after taking into account the uncertainty. In comparison with the baseline estimate, the cost-effectiveness ratios of the interventions decreased with 8% to 19% in the best case scenario and with 9% to 29% in the worse case scenario.

Comparison with Australia, Estonia and Denmark

First of all, the four countries (Belgium, Australia, Estonia and Denmark) that conducted a GCEA study on alcohol listed volumetric taxation and advertising ban²³ as the most cost-effective strategies. Additionally, the cost-effectiveness of the interventions was examined more in detail by looking at the costs, averted DALYs and ACER. Table 2 only presents the data for Belgium and Estonia, since it is not possible to compare with the figures of Denmark or Australia due to conceptual and methodological differences²⁴.

Table 2: Cross-country comparison for Belgium and Estonia²⁵

Intervention	Annual intervention effect (DALYs per 1 million population)		Annual intervention cost (euros, per capita)		ACER (Euros per DALY saved)	
	Belgium	Estonia	Belgium	Estonia	Belgium	Estonia
Increased taxation (current +50%)	1,151	2,260	0.20	0.11	172	47
Random breath testing	91	1,423	2.41	0.55	26,400	387
Advertising ban	256	756	0.01	0.07	35	93
Reduced hours of sale	62	736	0.01	0.08	185	114
Brief intervention in primary care	213	755	1.30	0.56	6,123	747

Firstly, the Estonian interventions accomplish more gain in health than the Belgian interventions (e.g. random breath testing is ten times more efficient). This could be explained by higher prevalence of hazardous drinking and alcohol-related traffic accidents for Estonia. Actually, the 12-month prevalence of alcohol use disorders was 10.2% for Estonia and 5.8% for Belgium. The alcohol-attributable fractions for road traffic accidents are also much higher for Estonia (44.9% for males, 44.3% for females) than for Belgium (19.5% for males, 7.8% for females) (WHO, 2014)²⁶. Secondly, the intervention costs per capita are higher for Belgium, except for advertising ban and reduced hours of sale, and this may stem from economic differences between the countries. The eastern European

countries have a lower economic power in terms of GDP than western European countries (Shield, Kehoe, Gmel, Rehm & Rehm, 2012). Moreover there is an eight-year time lapse between the two studies, consequently it was expected that Belgium would report higher costs due to inflation.

The higher effects and lower costs for Estonian alcohol interventions logically lead to better cost-effectiveness ratios. Nevertheless, both countries have the highest cost-effective rates for the three legislative interventions in comparison to random breath testing and brief intervention. As for these other interventions, we notice that brief intervention is the more favourable cost-effective option for Belgium, whereas random breath testing is the most cost-effective strategy for Estonia. As mentioned before, the alcohol related traffic accidents are an important contributor to burden of disease in Estonia and thus the effect of random breath testing is much higher.

4. DISCUSSION

This study contributes to the discussion to what extent the GCEA approach can be applied to develop comparisons on the cost-effectiveness of alcohol policies between countries. Therefore, it starts with an evaluation of the Belgian alcohol interventions in terms of cost-effectiveness. This Belgian contextualisation of the GCEA is conducted in order to provide decision-makers with information on what could be achieved if they could start again to design the alcohol policy and reallocate all resources (Edejer et al., 2003).

The results show that the Belgian policy makers should ideally adapt legislative interventions (advertising ban, volumetric taxation and a reduction of opening hours) in order to develop the most cost-effective alcohol policy. These legislative interventions are environmental prevention measures with a universal form, therefore these results are in line with the “prevention paradox”. The paradox states that interventions targeted to the whole population (universal prevention) are more likely to reduce population levels of alcohol-related harm than are those addressing high-risk groups (Rose, 1981; Stockwell et al., 2004). During the recent years, the Belgian government adopted these legislative interventions to a limited extent. A code of conduct on advertising for alcoholic beverages have been developed in 2013, nevertheless this code does allow promotion be it under specific terms (e.g. advertising may not suggest that alcohol is needed to create a festive atmosphere). Moreover, the Belgian alcohol excise duties have been raised in 2013 (e.g. for still wine with 8%: 4.22 euros/HL). Still the taxation rates are lower than those in other countries. For instance it would take a 50% increase of Belgian excise wine duties for 2008 to make the taxation wine rates similar to the ones in

the Netherlands (European commission, 2008). Despite the implementation of these alcohol policy strategies in recent years, the examples show that there is still room for improvement for the Belgian alcohol policy from a public health perspective. As for the non-legislative interventions, the Belgian policymakers should prefer investments in brief intervention above random breath tests. The strength of brief intervention lies in two areas: aimed to change personal behaviour and to target the hazardous/harmful drinkers (instead of the general population). In the recent coalition agreement of the Federal government (2014), however, the focus lies on increasing the drink driving tests (target population of one in three drivers per year)²⁷.

In conclusion, this GCEA examines the intervention mix for alcohol control in Belgium, and reveals a number of factors that might improve the cost-effectiveness of the alcohol policy. Ideally, this leads to an evidence-based policy, where the financial resources are assigned to the most cost-effective interventions (Wood et al., 2010). Despite the high number of DALYs that could be averted by universal prevention strategies (e.g. advertising ban, volumetric taxation and a reduction of opening hours), it should be stated that more targeted strategies for addressing harm related to hazardous alcohol users (e.g. brief intervention) are also required (Stockwell et al., 2004). In addition, policy makers need to keep in the mind that alcohol policy should focus on multiple domains (Anderson & Baumberg, 2006), therefore the roadside breath-testing may remain important for Belgium as a specific intervention in the policy domain to reduce drinking and driving. It is clear that the alcohol policy is a cross-cutting issue, meaning that the management is not limited to one single sector, it encompasses the central government and the other public sector agencies who are involved (Butler, 2009). Moreover, this policy is not only driven by the public health perspective, the implementation of alcohol interventions is also determined by political feasibility and public acceptance. In this regard, interventions influencing the alcohol price or availability might not be politically popular in a society dominated by free markets and consumer rights (Jernigan, Monteiro, Room & Saxena, 2000). The alcohol industry is also involved in the alcohol policy process as a stakeholder. In the past, the extensive lobbying by the alcohol industry obstructed the implementation of cost-effective policies and initiatives in multiple countries (Caswell & Maxwell, 2005; Hope, 2006; McCambridge, Hawkins & Holden, 2014). In Belgium, the National Alcohol plan 2014-2018, that proposed evidence-based alcohol policy interventions, could not be implemented due to a lack of political consensus for the proposed measures related to the supply side of alcohol (Plettinckx et al., 2014).

This GCEA allows us to evaluate multiple alcohol interventions for one country or region, and in doing so, it provides a framework for future policy directions. Moreover, a GCEA cross-country comparison may provide important insight into the dynamics of alcohol policy by exploring the cost-effectiveness

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of various policy options. Country profiles providing information on alcohol policy and its impact on DALYs could be compiled and used as an economic evaluation tool to find the most cost-effective way of organizing alcohol interventions in different settings. It is unknown if this GCEA approach can be applied to develop comparisons between countries (Ritter, 2007). Therefore, the main goal of this study was to investigate if the GCEA could be used as a comparative measure. A cross-country comparison have been conducted for Estonia and Belgium. The results of this cross-country comparison are limited to an evaluation of alcohol intervention effects and their costs, no statements can be made about the quality of the interventions in the different countries. The main conclusion is that the legislative interventions are the most cost-effective strategies, furthermore we notice better cost-effectiveness ratios (for each intervention except advertising ban) for Estonia. This variation in cost-effectiveness ratios could be explained by the country specific prevalence of hazardous drinking and alcohol-related traffic accidents.

The current study could not draw conclusions on a cross-country level with Australia and Denmark because the variations could be attributed to methodological differences. Moreover, the results of the comparison between the Belgian and Estonian GCEA should be interpreted with caution. During the data collection of this GCEA study, we were confronted with a couple of methodological limitations, and these limitations may lead to distorted figures or could endanger the cross-country comparison.

Firstly, the effect of each intervention was limited to the measurement in terms of *reduced hazardous alcohol use and reduction of road traffic accidents* (for RBT and drink diving campaign) in the current study, as was the case in the studies of Lai et al. (2007) and Chisholm et al. (2012). Whereas Cobiac et al. (2009) and Holm et al. (2014) evaluated the effect on multiple alcohol-related diseases (e.g. ischaemic heart disease, cirrhosis, cancer, etc.) and injuries (e.g. road traffic accidents, falls, fires, etc.). It is clear that the latter studies have a broader scope and, consequently, the effect of alcohol interventions in terms of DALYs is higher. The GCEA studies should use a common conceptual framework, such as the WHO cost-effectiveness modelling framework, in order to facilitate cross-country comparisons. The WHO framework allows us to evaluate all interventions in a consistent and comparable manner since it provides a theoretical framework of analysis, the definition of interventions, the concept of the counterfactual, the intervention implementation period, etc. (Edejer et al., 2003). If GCEA studies opt for a broader scope than the WHO framework, it is recommendable to present the results for hazardous alcohol use separately from those for alcohol-related diseases and injuries.

Secondly, each *intervention effect* derives from scientific research, but the results of different outcome studies (e.g. CEA) may conflict. These studies cannot produce the absolute truth, because the effectiveness of a particular intervention will be determined by multiple factors. For example, in contrast with Saffer and Dave (2002), other studies (Nelson & Young, 2001; Nelson, 2010) state that advertising bans do not reduce alcohol consumption. Nelson & Young (2001) even state that advertising bans may lead to a consumption increase because suppliers compete for market share by price falls. Consequently, a GCEA is determined by the intervention effects that are derived from outcome studies. This problem can partially be overcome by taking into account the effectiveness of alcohol interventions published in systematic review or meta-analysis studies. The extrapolation of intervention effects may still be difficult because these review studies are also confronted with different sociocultural settings (e.g. regional patterns of drinking may influence the effect of an intervention; Chisholm et al., 2004). For example, the generalisability of the findings of Elder et al. (2004), Shults (2001) and Peek-Asa (1999) to other countries (such as Belgium) may be questioned, since these reviews mainly used data from the US and Australia. Therefore, GCEA studies conduct an uncertainty or sensitivity analysis in order to incorporate the sustainability of intervention health effects over time or to take into account the best and worst case scenario of the effectiveness of interventions. However, the current GCEA cross-country comparison was limited to point estimates of effectiveness ratios (without taking into account the ranges of intervention effects) and compares the average cost-effectiveness. Ideally, GCEA studies should consult meta-analysis²⁸ that investigate the effectiveness of alcohol interventions by regions and they should conduct a sensitivity analysis.

The GCEA studies are confronted with additional limitations concerning the interventions effects. The GCEA only takes into account the primary purpose of alcohol interventions (namely the reduction of alcohol consumption and road traffic accidents); other effects like productivity gain or reduced violence are not considered. For instance, a reduction in violence is an important effect of the intervention that restricts opening hours (Duailibi et al., 2007). The effect of preventive interventions may also be underestimated since the impact of prevention on drinking behaviour is difficult to measure and the effect depends on intermediary variables (Birckmayer, Holder, Yacoubin & Friend, 2004). Furthermore, limited information about the interaction of interventions, and how this affects the effectiveness of intervention combinations, is available for the GCEA studies (Holm et al., 2014). It is clear that the effect of interventions on alcohol consumption should be interpreted carefully since the effectiveness of interventions are imbued with a degree of uncertainty (Hutubessy et al., 2003). Further research is necessary to strengthen the evidence on interventions effects, moreover the combined effect of multiple interventions should be investigated.

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Thirdly, the GCEA is limited to *intervention costs* from a health sector perspective (resources of the public providers and the private sector). Costs for the family or intimates, time costs of the patient to participate at the interventions and productivity losses were excluded. Other potentially negative (e.g. loss of freedom for legislative interventions) and positive effects (e.g. productivity gain due to decreased alcohol consumption) have neither been estimated. Moreover, the cost calculation of interventions is determined by multiple factors such as the coverage rate of interventions (e.g. random breath testing for 40% of the drivers versus 20% of the drivers) and the data sources. For instance, intervention costs for health interventions have been calculated for Belgium (year 2005) in the study of Chisholm, Rehm, Frick & Anderson (2009)²⁹, and a comparison with the current GCEA study (year 2008) shows us large differences between intervention costs: e.g. the cost for brief intervention (with coverage rate of 30%) was estimated to cost 43.9 million euros in the study of Chisholm et al. (2009) and 13.9 million euro in the current study. The differences in cost calculation could be attributed to the data source, since Chisholm et al. (2009) obtained cost information by regional costing experts (data source WHO CHOICE: Johns, Baltussen & Hutubessy, 2003) and the current study collected country-specific costs from the governmental administrations. Consequently, a cross-country comparison should take into account GCEA studies with similar data sources. The data from governmental administrations is recommended since these actors dispose of more complete data on public authorities funding.

Fourthly, each GCEA study uses *disability weights* to calculate DALYs. However, it is not possible for the GCEA studies, in terms of research time, to establish an expert panel to investigate the country-related disability weights. Scientific research has to be consulted, for example Lai et al. (2007) use data from an Estonian burden of disease study (Lai et al., 2003) and Chisholm et al. (2009) refer to the Dutch disability weight study (Stouthard et al., 2000). Methodological differences (e.g. valuation method) occur between these disability weight studies, this may influence the DALYs in the GCEA studies and the cross-country comparison in a next phase³⁰. Moreover, the disability weights in the Netherlands (Stouthard et al., 1997) and global burden of disease study (Murray & Lopez, 1996) are calculated for different stages of a disease. No Belgian incidence or prevalence data are available on this detailed level (problem drinking versus manifest alcoholism), therefore the average disability weight for alcohol disorders is used. This may result in less accurate figures.

These limitations confirm that the GCEA must be regarded as an approximation because it is built mainly on various assumptions. In order to have the most realistic estimation it is important to collect accurate demographic and epidemiological information. In fact, the quality of the data is a crucial factor for a GCEA, since they determine the success of a GCEA study. Moreover, a uniform

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methodology is necessary to compare the cost-effectiveness of different alcohol policies. In this respect, the initiative of the WHO to develop a guide to GCEA is a step in the good direction. During the contextualisation process of a GCEA study, it is still very likely that the uniformity of the methodology will be endangered by the input of parameters (such as target coverage rate of the interventions, the choice of the intervention effect, the cost calculation of the interventions, etc.), and this may disturb the possibility to conduct a cross-country comparison. From a methodological point of view, the GCEA is not the best way to compare alcohol policies between countries. Methodological problems have also been acknowledged in other types of studies that compared alcohol policies, namely public expenditure and social cost studies (Lievens et al., 2012; Ritter, 2007). In conclusion, the challenge continues: finding a way to overcome the methodological and conceptual problems in a cross-country comparison of alcohol policies.

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6. ENDNOTE

¹ DALY is a metric to determine the burden of disease. Therefore, it takes into account the years of potential life lost (YLL) due to premature mortality and the years of productive life lost (YLD) due to disability.

² In a 2008 Belgian health survey 10.3% of the participants reported a problematic alcohol consumption (Gisle et al., 2010). Additionally, it can be noticed that 41% of the Belgian students reported heavy episodic drinking during the past 30 days (Hibell et al., 2009).

³ Denmark represents a Nordic country and Estonia belongs to the central-eastern and eastern country group. These geographical areas are based upon drinking traditions and patterns (WHO, 2013).

⁴ The traditional CEA is limited to evaluations of new interventions in comparison with the current mix.

⁵ DALY is the sum of years of potential life lost (YLL) due to premature mortality and the years of productive life lost (YLD) due to disability.

⁶ Age-weighting, which is also available in the WHO-CHOICE tool, has not been conducted for the cross-country comparison (the Estonian study did not use age-weighting either). Age-weighting is used in GCEA studies to take into account the lower value of life at young and older ages than people in middle-age (Edejer et al., 2003).

⁷ However, the cross-country comparison for Belgium and Estonia is limited to a comparison of the average cost-effectiveness ratios. Since the Estonian study (Lai et al., 2007) did only report the mean intervention effects and costs in detail.

⁸ The prevalence, mortality and remission for alcohol disorders are provided as inputs in DISMOD II. This software tool is used to calculate the incidence and case-fatality for alcohol disorders.

⁹ Nevertheless, a cost calculation over 10 years is conducted in order to simulate an intervention implementation period of 10 years. We took into account that some costs (e.g. campaign for alcohol advertising ban) are only made in the first year of the intervention.

¹⁰ Except for the study of Cobiac et al. (2009) that measured the time and travel cost for the patients.

¹¹ There is no intervention selected in the fourth domain (e.g. interventions with focus on responsible beverage service or safer bar environment), because the effect on alcohol consumption or road traffic accidents could not be confirmed by a systematic review or meta-analysis. Three interventions (increased taxation, advertising ban and reduced hours of sale) belong to the first domain of regulating the alcohol market.

¹² Other GCEA studies took into account five to eight interventions. The study of Estonia (Lai et al., 2007), which is included in the cross-country comparison, refers to five interventions: increased taxation, roadside breath-testing, reduced access to retail outlets, advertising ban and brief advice in primary care. The current study also takes into account the mass media campaign in order to evaluate an intervention of the fifth policy domain that supports education, communication, training and public awareness.

¹³ The intervention effects in terms of alcohol consumption are used to estimate the effect on incidence or prevalence of hazardous alcohol use. For example, a 4% reduction in the incidence of hazardous alcohol use for advertising ban is simulated based upon the results of Saffer and Dave (2002) (Chisholm et al., 2004).

¹⁴ The 15% reduction of non-fatal injuries via RBT is retrieved from studies that analysed the alcohol-attributable fractions for road traffic injury (Ridolfo & Stevenson, 2001; Rehm et al., 2004).

¹⁵ In alignment with Chisholm et al. (2004), the effect of elasticity on consumption is taken into account for two-thirds, because heavy drinkers are less responsive to price changes.

¹⁶ A decrease of 38g/week in alcohol consumption is similar to a reduction of 22% in case of a weekly alcohol consumption of 176g (weekly alcohol overconsumption for women from 150-180 grams and for men from 220-264grams).

¹⁷ The effect of interventions decreases if they are combined. In accordance with Chisholm et al. (2004), it is assumed that the combination of six interventions averts 92% of the sum of the individual interventions effects (DALYs).

¹⁸ Average cost-effectiveness ratio

¹⁹ The cost-effectiveness of the current situation has been measured by taking into account a current coverage rate of 15% for brief intervention, 20% for random breath testing, 20% for advertising ban, 10% for reduced hours of sale and 80% for the mass media campaign. Furthermore, the effect of the taxes in the year 2008 are simulated (excise tax as per cent of price, based on 100cls of each type of beverage: 23.9% for beer, 33% for wine and 53.5% for spirits).

²⁰ The intervention cost for increased taxation does not change, since it is assumed that the cost for the taxation control system will not rise if the excise taxation increases.

²¹ The intervention costs for advertising ban and reduced hours of sale include the yearly costs for enforcement and the cost for a media awareness campaign in the first year (150.000 euros distributed over ten years).

²² The cost of brief intervention is based upon the assumption of four visits to the general practitioner (Chisholm et al. 2004), meaning an average cost of 73.56 euros per patient per year (30% of these medical expenses is non-refundable for patients in Belgium).

²³ The intervention reduced opening hours was listed as third cost-effective strategy in Estonia, Denmark and Belgium. Australia did not evaluate this intervention, however “minimum legal drink age to 21” was ranked as third cost-effective strategy.

²⁴ The Australian and Danish study evaluated the intervention effects on multiple alcohol-related diseases and injuries whereas the Estonian and Belgian study measured the effect on hazardous alcohol use and the number of road traffic accidents.

²⁵ The cost-effectiveness of mass media “drink driving” campaign is missing since Lai et al. (2007) did not analysed this intervention for Estonia.

²⁶ The WHO modelled the prevalence of people with alcohol use disorders with a regression model. Only data for the year 2010 is available.

²⁷ In the analysis, a duplication of the target population for brief intervention (from 15% to 30% of the hazardous drinkers) and for random breath testing (from 20% to 40% of the drivers) has been simulated.

²⁸ The meta-analyses are preferred since these studies employ statistical methods to synthesize the effects from several studies into a single quantitative estimate (Petticrew & Roberts, 2006). Unfortunately, a limited number of meta-analyses (Moyer et al., 2002; Bertholet et al., 2005; Kaner et al., 2009; Wagenaar et al., 2009) were available for the analysis, therefore the current study retrieved the intervention effects mainly from systematic reviews.

²⁹ The WHO CHOICE tool developed guidelines to estimate the costs of the interventions (Chisholm et al., 2004); this tool has been used to evaluate the cost-effectiveness of interventions in reducing alcohol-related harm for 22 European countries (IAS, 2009).

³⁰ There is a cross-national agreement available on disability weights, but it is only calculated for 15 diseases (Schwarzinger et al. 2003). This study also indicates a high level of agreement on disability weights in Western European countries (method: visual analogue scale (VAS) and time trade-off technique).

CONCLUSION

In Europe, one widely accepted standard is that public resources should be used in the most efficient and effective way (Mandl, Dierx & Ilzkovitz, 2008), therefore governments need to supervise the expenditures and evaluate the policy at the same time. This dissertation tries to guide the policy makers with an economic evaluation of the drug policy. It presents an economic evaluation of the Belgian drug policy with a public expenditure study on legal and illegal drugs and a generalised cost-effectiveness analysis (GCEA) on alcohol. In addition, this dissertation contributes to European policy research with cross-country comparisons on public expenditures (on drug policy and substance abuse treatment in hospitals) and on cost-effectiveness.

In the first part of this chapter, the main results of the two studies that evaluated the Belgian drug policy are examined and recommendations for Belgian drug policy are formulated. The limitations of the public expenditure study and GCEA are discussed, and we provide avenues for future research. In the second part of this chapter, the main findings of the three cross-country comparisons are presented. Furthermore, we discuss if these types of cross-country comparisons could be used for future economic evaluations of drug policy. To this end, the potential role and limitations of the cross-country comparison are discussed, and recommendations for future research are formulated.

1. EVALUATION OF THE BELGIAN DRUG POLICY

The first paper in this dissertation provides an insight into how the drug expenditures are composed and what the public authorities so-called “policy mix” is. The public expenditure study allows us to evaluate the expenditures of the public authorities at each level of competency for the different policy domains. Moreover, it shows whether the government’s stated priorities for that drug policy are mirrored in their expenditures. Our analysis showed that there is no match between government’s spending and policy declarations in the Belgian case. The Belgian drug policy expenditure mix (illegal drugs, alcohol and psychoactive medication) consists of 76.5% treatment, 21.67% enforcement, 1.24% prevention, 0.24% harm reduction and 0.35% other. This contrasts with the provisions in the Federal Drug Policy Note (Belgian Federal Government, 2001) that states that prevention should get the highest priority and enforcement should be used as “ultimum remedium” towards drug users. Several reasons have been discussed to explain this mismatch, such as the historical resource allocation that is focussed on public expenditures for law enforcement and the bottom-up development of the Belgian drug policy. Furthermore, the study gives insight into the evolution of public expenditures on drugs over time. A comparison of the evolution of the public expenditures for illegal drugs between 2004

and 2008 showed that the expenditures for enforcement increased with 31%, while the expenditures for treatment remained stable and the expenditures for prevention even decreased with 8%. A higher percentage of recorded drug crimes led to this upward trend in enforcement expenditures, and this could be explained by the increased focus on public drugs nuisance (Ward, 2011) and drug tourism (Vander Laenen, De Ruyver, Christiaens & Lievens, 2011).

The third paper focuses on the generalised cost-effectiveness of alcohol interventions. This GCEA exceeds other economic evaluation tools, such as the cost-effectiveness and cost-benefit analysis, by evaluating multiple interventions on a country level. The current GCEA study examines the alcohol intervention mix for Belgium and reveals a number of factors that might improve the cost-effectiveness of the alcohol policy. The combination of six alcohol interventions (random breath testing, mass media “drink driving” campaign, increased taxation, advertising ban, reduced hours of sale and brief intervention in primary care) could annually save up to 18,000 DALYs, and would cost approximately 40.3 million euros per year. In terms of cost-effectiveness, an advertising ban appear to be the most cost-effective intervention to reduce alcohol burden, a volumetric taxation (+50%) and a reduction of opening hours complete the top three.

Policy recommendations

The public expenditure study and GCEA allow us to formulate recommendations for drug policymakers. Based upon these studies, decision makers might monitor the balance of resource allocation. Some people argue that the government need to strive for equality in the quantum of funds allocated to the various drugs and implementation sectors, others prefer budget allocation in accordance with the relative burden of the different types of drugs (McDonald, 2011). Another approach, more consistent with WHO principles, is that resource allocation should be based upon existing evidence for cost-effectiveness. The public expenditure study and GCEA might be useful for the resource allocation, nevertheless a full policy evaluation can only be completed by combining information about public expenditures with a range of other types of information/studies (e.g. epidemiological data about new trends in drug use and groups of (problem) drug users, data about target groups in prevention, early intervention and treatment, evaluation and cost-effectiveness studies, etc.)

It is recommended to invest more in *alcohol* prevention from a cost-effectiveness point of view as well as from a social cost point of view. In fact, the high social costs due to harmful use of alcohol (Degreef, Pacolet & Bouten, 2003) could be diminished, the implementation of cost-effective alcohol interventions could avoid the high number of treatment admissions in hospitals, and decrease the

public treatment expenditures. The results of the GCEA show that the Belgian policy makers should ideally adapt legislative interventions (advertising ban, volumetric taxation and a reduction of opening hours)¹. Furthermore, the mass media “drink driving” campaign have also proved to be a cost-effective measure. Doran et al. (2008) argue that these campaigns are most likely to be effective when combined with the (more expensive) intervention random breath testing (Doran et al., 2008). However, if Belgian policy would be confronted with the choice to increase public financing for random breath testing or brief intervention, than brief intervention should be the more favourable option from a cost-effective point of view. The effect of brief intervention (per year) is much higher for Belgium: 974 DALYs are averted by random breath testing versus 2,267 DALYs averted by brief intervention. Moreover, it should be stated that the effect of brief intervention may be even higher (in terms of DALYs) since the intervention may also positively influence the prevalence of other alcohol-related diseases (e.g. ischaemic heart disease, cirrhosis, cancer, etc.). This GCEA was restricted to six interventions, we cannot make any statements about other cost-effective interventions such as warning labels on alcohol products, responsible beverage service, lower BAC for youth, etc.

The public expenditures study regarding *illegal drugs* indicates that the public spending on prevention and harm reduction are but a fraction of the amount spent on treatment and law enforcement. The high amount of expenditures on illegal drug treatment is not necessarily bad since the consensus in many cost-effectiveness studies is that “drug treatment works” and that treatment produces social benefits that exceed its programmatic costs (Gerstein et al., 1994; Rajkumar & French, 1997; Cartwright, 2000; Harwood et al., 2002; Strang et al., 2012). The GCEA study in this dissertation was limited to alcohol interventions and cannot provide recommendations on the type of interventions that should be implemented to improve the cost-effectiveness of the illegal drug policy. However, screening and brief intervention programmes appear to be cost-effective for illegal drug abuse (Strang et al., 2012). Furthermore, we recommend to invest more in harm reduction in order to avoid costs in the more expensive sectors (treatment and enforcement). It has been proven that interventions such as needle syringe programmes, opioid substitution therapy and drug consumption rooms are cost-effective (Strang et al., 2012; Wilson, Donald, Shattock, Wilson & Fraser-Hurt, 2015; Rhodes & Hedrich, 2010).

Finally, a budgetary boost for the prevention of *psychoactive medication* could also be encouraged, since the prevention expenditures was negligible in the public expenditure study. This is in contrast with the fact that Belgium is a country with a high use of anti-anxiety and sedative drugs (Anthierens et al., 2007). In a 2008 Belgian health survey 10% of the respondents used sleeping tablets, 7% tranquilisers and 6% anti-depressants in the two weeks preceding the survey. These percentages

decreased in the year 2013, nevertheless 20% of the people aged 75 years and older reported the use of anti-anxiety and sedative drugs in the last 24 hours (Drieskens & Gisle, 2015). The study of Bourgeois et al. (2012) confirms the high prevalence of chronic benzodiazepine use in Belgian nursing home. In accordance with Anthierens, Habraken, Petrovic & Christiaens (2007), general practitioners need to be more aware of the addictive nature of benzodiazepines, and a non-pharmacological approach should be promoted as the best first approach. A prevention campaign could improve the attitude of the general practitioners towards a decrease of psychoactive medication (by analogy with the campaign on antibiotics), ideally this campaign also focuses on the patients (target population of people aged 75 years and older). However, the cost-effectiveness of this intervention is unknown, no CEA studies on psychoactive medication campaigns have been conducted.

Limitations and suggestions for future research

Firstly, the limitations of the public expenditure study are related to the conceptual and methodological framework. A public expenditure study is limited to the estimation of public expenditures on drug policy actions; neither private expenditures nor external expenditures are included. A social cost study is required to provide the total social cost of drugs in a given society, and then the drug budgets could be contrasted with the (economic) impact of the various types of drugs. Furthermore, public expenditure estimates are always associated with a degree of uncertainty because of data quality and cost calculation methods. For example, the proration method could lead to distorted figures, because this methodology assumes that in the case of law enforcement, all criminal activity has the same unit cost.

Secondly, the GCEA in this dissertation is also confronted with limitations with regard to the scope and methodology. This GCEA only takes into account the primary purpose of alcohol interventions: namely the reduction of alcohol consumption and road traffic accidents. The effect of interventions on ischaemic heart disease, cirrhosis, cancer, etc. is excluded. Consequently the population health effect of alcohol interventions is underestimated. Furthermore, the GCEA must be regarded as an approximation, since the results are determined by the input of multiple parameters (such as the intervention effect, the cost calculation of the interventions, etc.). For example, the results are based upon point estimates of effectiveness ratios (without taking into account the ranges of intervention effects), despite the fact that the effectiveness of interventions are imbued with a degree of uncertainty (Hutubessy, Chisholm, Edejer, & WHO-CHOICE, 2003). Moreover, these effectiveness ratios of alcohol interventions are retrieved from review studies, since no information was available on Belgian country-specific effectiveness of interventions. There was also limited information available

about the interaction of interventions, and how this affects the effectiveness of intervention combinations (Holm, Veerman, Cobiac, Ekholm & Diderichsen, 2014).

In conclusion, despite these limitations, the public expenditure study and the GCEA can provide a valuable basis for an assessment about the public spending and about cost-effectiveness, and contribute to a more evidence-based drug policy. Caution must be applied when using the results of a free-standing public expenditure study for policy (decision making) purposes. A public expenditure study identifies facts that are worth looking into more deeply, but only further research can detect a lack of performance (e.g. inefficient programmes or interventions with limited cost-effectiveness). The GCEA has proven to be a valuable evaluation tool to formulate recommendations for an evidence-based alcohol policy, however, the results should also be interpreted with caution. The GCEA might favour interventions that are cheap from a budget point of view, but expensive in terms of loss of freedom (e.g. advertising ban). Moreover, it ignores the political reality that the alcohol industry and consumers are stakeholders in the alcohol policy making process. The implementation of interventions is also determined by political will, financial resources, expertise, and public awareness and support (WHO, 2004). Therefore, it seems advisable to take into account the cultural, social, political and economic situation of a country before formulating policy recommendations.

Future research is necessary to formulate recommendations for a cost-effective policy for illegal drugs. The cost-effective government interventions in the GCEA studies for reducing substance-related harm are not relevant for illegal drugs, since it cannot be controlled via mechanisms such as taxation or advertisement bans. More empirical evidence on various interventions is required in order to develop the most cost-effective repression, prevention, harm reduction and treatment strategies for illegal drugs (Chisholm et al., 2006). Furthermore, the economic evaluation studies also need to broaden the focus of substances to the abuse of psychoactive medication. This type of substance-related harm has been neglected in evaluation studies so far.

2. EVALUATION OF DRUG POLICIES WITH CROSS-COUNTRY COMPARISONS

The first paper conducts a cross-country comparison on public expenditures for drug policy (illegal drugs). The results show that the Netherlands (0.36% of GDP), Germany (0.22%-0.26% of GDP) and Sweden (0.19% of GDP) are confronted with higher expenditures for drug policy in comparison with France (0.06% of GDP) and Belgium (0.09% of GDP). A possible explanation lies in the history of the countries' drug policy, namely the late development of a drug policy may delay the growth in the financial investments in drug policy. Furthermore, the drug expenditure mixes of different countries are compared: harm reduction and prevention are the smallest sectors in each of the four studied

countries (Belgium, Sweden, the Netherlands and Australia²). Consequently, the recommendations for the Belgian drug policy, to invest more in drug prevention and harm reduction, does also account for these countries.

The second paper in this dissertation concentrates on the public spending for illegal drug and alcohol treatment in hospitals for 21 EU member states. Firstly, total public spending for hospital-based treatment of illegal drug and alcohol abuse in the 21 EU member states studied is estimated to be 7.6 billion euros. The results confirm other studies indicating that public expenditures for alcohol treatment exceed those for illegal drug treatment. Given these high costs on alcohol treatment, the EU member states should invest more in alcohol prevention and early intervention. Secondly, the expenditures (per capita) for treatment of illegal drug abuse are presented, ranging from 0.1 euros in Romania to 13 euros in Sweden. For alcohol abuse, that figure varies from 0.9 euros in Bulgaria to 24 euros in Austria. The variation between countries is explained by factors such as the hospital cost per day, the organization of substance abuse treatment, cultural and social norms regarding substance use, etc. The prevalence of problematic (illegal or legal) drug use in a country did not correlate significantly with the number of hospital days and the expenditures that come with it.

The third paper focuses on a cross-country comparison with GCEA on alcohol interventions. In fact, the cross-country comparison shows that the legislative interventions (increased taxation and advertising ban) are the most cost-effective strategies in Australia, Belgium, Estonia and Denmark. Furthermore, Estonia generates better cost-effectiveness ratios than Belgium, especially for random breath testing (Estonia: 387 euros per DALY saved; Belgium: 26,400 euros per DALY saved). This could be explained by the higher prevalence of hazardous drinking and alcohol-related traffic accidents in the Estonian population. In conclusion, the cost-effectiveness of an alcohol policy is determined by the mix of interventions and the epidemiological situation of a country.

Potential role, limitations and suggestions for future research

The public expenditure and GCEA approach are both distinguished as interesting tools to develop comparisons between countries (Ritter, 2007). These comparisons make it possible to view the different options in drug policy and would enable to monitor drug policy interventions with benchmarking information on public spending and cost-effectiveness. The potential role of cross-country comparisons is discussed with the help of two examples. Firstly, the cross-country comparison with GCEA allows us to formulate recommendations to improve cost-effectiveness of alcohol policies. The legislative interventions have been acknowledged as most cost-effective strategies (increased taxation, advertising ban and reduced opening hours) in four GCEA studies (Belgium, Estonia, Australia

and Denmark). This cross-country comparison confirms the benefits (in terms of averted DALYs) of these legislative interventions in different settings. Ideally, this should enhance the implementation of legislative interventions in other countries. The second example is provided by the EU cross-country comparison on hospital expenditures. This study presented the impact of substance abuse treatment in hospitals on a country's budget, and these data can also be used to illustrate the budgetary consequences of different drug policies. The results showed that Sweden had the highest expenditures (13 euros per capita) for illegal drug treatment in hospitals. These results could be explained by the high cost of hospitalisation and the organization of substance abuse treatment (high proportion of hospital days attributable to illegal drug treatment). Moreover, it shows that a drug policy which prioritises a drug free society and abstinence-driven treatment is more likely to be confronted with high hospital costs. However, future research is necessary to prove this correlation.

Despite the advantages of the cross-country comparisons, we should take into account some important limitations. The first and third paper conducted a cross-country comparison with single-country (public expenditure or GCEA) studies, consequently the quality of the comparison is determined by the conceptual and methodological framework that these individual studies applied. In the first paper we conclude that the *public expenditure studies* can only be of limited value for decision makers due to conceptual and methodological differences. Multiple countries conducted a public expenditures study, and they used different concepts and definitions to define the term "public expenditure" (Vander Laenen, Vandam, De Ruyver & Lievens, 2008). For example, the studies of Sweden and the Netherlands take into account a fraction of the reactive expenditures (e.g. expenditures for HIV/AIDS treatment to patients infected via IDU and drug related crimes). The public expenditure studies are also a fragile constructions from a methodological point of view, since variances occur due to differences in calculation method. It seems that a uniform methodology is necessary to compare public expenditure studies. In this respect, the initiative of the EMCDDA to develop a common EU-wide methodology for public expenditure studies warrants applause (EMCDDA, 2008). In the third paper, it is stated that a uniform methodology for the GCEA, such as the WHO framework (Edejer et al., 2003), allows us to compare the cost-effectiveness of different alcohol policies. Nevertheless, the uniformity of the methodology may be endangered during the contextualisation process of a GCEA study, namely during the input of country-specific data (e.g. target coverage rate of the interventions, cost calculation of the interventions, etc) and other parameters (such as the choice of the intervention effect). Therefore, the GCEA might not be the best way to compare alcohol policies between countries.

CONCLUSION

This dissertation confirms that a common conceptual and methodological framework is indispensable for a valid cross-national comparison on public expenditures or cost-effectiveness. The cross-country comparison on hospital expenditures shows us that a uniform method could be applied with data of international databases. However, future research is necessary to improve these databases and to expand the cross-country comparison to public spending on other types of treatment. Therefore, the international databases (e.g. Eurostat) should provide systematic data of in- and outpatient activities (outpatient treatment sessions for substance abuse, inpatient days for substance abuse, consultations for substitution treatment, drug treatment counseling in prisons, etc.). Furthermore, the data coverage of the Eurostat database should also be improved to obtain more reliable results for the EU member states since the consistency of reporting is indispensable for international benchmarking of budget expenditures across countries. All these factors might improve the quality of cross-country comparisons, however, it should be stated that even an identical methodology will still make it difficult to compare public expenditures or cost-effectiveness ratios across countries. The countries differ in terms of social security systems, institutional structures, cultural traditions, etc.

In conclusion, a set of generic problems have been acknowledged during the cross-country comparison of public expenditures and the cost-effectiveness of interventions. At this moment, a valid cross-country comparison could only be conducted on the public spending for illegal drug and alcohol treatment in hospitals. It seems that the challenge continues: finding a way to overcome the methodological and conceptual problems in a cross-country comparison of drug policies.

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4. ENDNOTES

¹ During the recent years, the Belgian government adopted these legislative interventions only to a limited extent. The National Alcohol plan 2014-2018 proposed some cost-effective legislative interventions (e.g. restriction of the purchase of alcohol), however they could not be implemented due to a lack of political consensus for the proposed measures related to the supply side of alcohol.

² Except for Australia: Moore (2008) measured the public spending for school-based drug prevention programmes, therefore Australian prevention expenditures (23%) are higher than treatment (17%).